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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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October 2, 1974 Vol. VIII, No. 40

NEWS IN BRIEF

DC Computer Snafus Force Vote Recount

WASHINGTON, D.C. – The Board of Elections here ordered all ballots counted by hand when an inaccurate vote tally in one ward cast doubt on all computer tabulations of the Sept. 10 mayoral and city council primary elections.

The citywide recount was ordered Sept. 17 following a hand count which reversed a city council election result in ward five, according to an election official.

Both hardware and software malfunctions on a Control Data Corp. 1700 combined to delay final election totals more than 22 hours after the polls closed [CW, Sept. 18], and the hand recount indicated equipment and programming problems may have rendered many of the tallies inaccurate as well.

Election Board Chairman Robert E. Martin said an investigation of the computer system breakdown is underway. "The results of this inquiry will determine whether a computer system is used in the November elections and whether we will take legal action against CDC," he said.

Busing Boggles Boston DP; Schedules Marked Absent

BOSTON – The School Department's data processing center here pushed so hard to provide students with school assignments in compliance with a Federal court desegregation ruling that it failed to complete class schedules by the opening of schools.

"School assignments did have priority over class schedules," commented Jim Dailey, the center's DP manager. "But even with the help of a system at a local hospital, we simply ran out of computer time."

Because students didn't have final school assignments until late in the summer, many had never met with their advisors to devise programs for class work, he added.

Despite missed deadlines, "the computer center was invaluable in assigning

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On the Inside This Week

"Human Touch" Lacking in MIS —*Page 9*

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In FCC Filings

Protests Engulf IBM Satellite Venture

By Tom Geyer
Of the CW Staff

WASHINGTON, D.C. – The rising chorus of alarm against IBM's plan to buy a controlling interest in CML Satellite Corp. grew to a crescendo last week as a number of organizations in the computer and communications industries submitted comments and protests to the Federal Communications Commission (FCC).

IBM's efforts this summer to play down its proposal as a minor step appeared doomed to failure – whatever the outcome of its petition.

The joint IBM-Comsat satellite communications plan is clearly going to be a hotly contested issue.

The plan is "a blatant attempt to totally capture the market of the future," insisted Sanders Associates, a manufacturer of IBM-compatible terminals.

It may well "forge an impenetrable barrier to successful market entry by other parties," seconded Western Union in a petition to extend the comment period to Nov. 13.

"The opportunities for IBM and an owned or controlled communications carrier to unite computer and communications services in exclusionary ways are literally, and unfortunately, beyond enumeration," the Computer Industry Association (CIA) told the commission.

"Over 50% of the business data in the U.S. and abroad is coded and managed in IBM machines, according to IBM-specified procedures," the CIA added.

"When this data moves, it moves very largely – up to the transmission stage – through IBM-owned or manufactured circuits, according to IBM-specified or influenced procedures.

"If IBM also controls a major means of communication linkage, then the company will have a major additional dimension with which to effect exclusionary arrangements," the CIA claimed.

Recalling Sherman

All three onlookers attacked the proposal on antitrust grounds.

Sanders charged that "with liquid resources . . . of over $3.5 billion and retained earnings of over $5.5 billion and accounting practices that have written off over half its plant (as compared with AT&T's plant write-off of only 20%), IBM is in a position to take steps to capture the new information handling market which could not be counteracted by any other group, including AT&T."

The commentators raised the specter of

(Continued on Page 2)

GOP Policy Group Pushes Stiff Privacy Guidelines

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. – Because the computer community has not been able to adopt a code of ethics to protect personal information in computerized data banks, the government may have to do it, a Republican task force hinted recently.

In a wide-ranging report on personal privacy and data bank systems, the House Republican Research Committee's Task Force on Privacy noted that "some efforts" to foster professionalism in the industry have been made.

"But," the group added, "the information industry as a whole has not supported such efforts as a matter of policy.

"The task force declares its commitment to the development of a professional standard of conduct and code of ethics for the persons involved in the development, maintenance, management and use of personal information systems," the report noted in a veiled warning.

Policymaking Arm

The Republican Research Committee is a policymaking arm of the Republicans in the House of Representatives and its endorsement of this strong privacy stand indicates the Republican party may make privacy an issue in this fall's congressional elections, political sources here said.

A strong stand on privacy, the sources indicated, could help the Republican party shed its Watergate-tainted image and could be a successful tactic particularly because of President Ford's interest in the issue.

The task force, chaired by Rep. Barry

(Continued on Page 6)

NBS Report Due

DP Center Security Plans Set

By a CW Staff Writer

WASHINGTON, D.C. – The National Bureau of Standards (NBS) will release guidelines for physical security of DP centers this week that call on federal agencies to implement more stringent measures to protect their computer centers.

Data confidentiality and computer room security are interdependent subjects of "the greatest national interest," according to Dr. Ruth Davis, director of the Institute for Computer Science and Technology at NBS, in the introduction to the 92-page report.

The publication – Federal Information Processing Standards (Fips) Publication 31 – outlines 10 steps federal agencies should follow in establishing and running physical security programs.

First, the programs need to be formally organized with clear lines of responsibility for their implementation, the action summary for the report noted.

During this phase, a task force should be set up to conduct a risk analysis for the installation, the report said.

The second phase of a physical security program would be the actual risk analysis study, the report noted, indicating such an analysis should consider such factors as losses due to natural disasters, fires, theft, sabotage, the loss of power and so forth.

The risk analysis should establish the

(Continued on Page 4)

VS Goes by Book, Traps Casual DOS Code

By Don Leavitt
Of the CW Staff

MOSCOW, Idaho – Users still facing a conversion from DOS/360 to OS/VS or VM/370 might learn something from the University of Idaho, and the lesson is essentially positive, according to William Accola, director of the university's computer center.

The university has shifted from a 128K 360/40 running under DOS with 2314 disk drives to a 512K 370/145 running under VM/370 (using OS/VS1, DOS and CMS) with 3330 disk drives. A time-sharing operation was added in the process.

The conversion period, which started earlier this year and climaxed with the installation of the 145 on Aug. 1, was "a pretty hectic experience and I wouldn't want to do it again," Accola said. He has no complaints, however, adding "most problems are ours, not IBM's." Even with the two or three incidents in which VS1 was suspect, the problem turned out to be the university's, the director said.

For example, they had had difficulty accessing Isam files. It turned out, however, that the programs written for the 360/40 had used different key lengths for each of the Isam records and even though that was "against all the rules," DOS had accepted the coding. OS/VS1, however, wouldn't accept the improper coding "and it took us quite a while to solve the problem" since the programs had worked under DOS, he said.

Basically, DOS had been too lenient, he agreed. In any case, the shift to VS1 was not as transparent as he had expected, "but I don't feel IBM missold anything when they indicated [the changeover] would be transparent.

"We just didn't get started in time to get everything fully converted before the machine was installed," he went on. "We're like a lot of administrative

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IBM Satellite Plans Stiffly Protested

(Continued from Page 1)

IBM using its *de facto* control of computer interfaces and communications protocols to "lock in" users over worldwide information networks.

"In its own backyard – data processing – IBM has pursued a course of conduct designed to make it extremely difficult or impossible to interconnect competitive devices to its own equipment," Sanders said.

"Under guise of complexities of satellite communications and employing an added feature – software – IBM can and will conjure up all manner of obfuscating reasons to impede interconnection for all but its own business products and customers.

"The strategies embodied in its new product announcement [Advanced Function for Communications] will find their ways into regulated communications."

The CIA emphasized its conviction that the FCC should make sure – if IBM is allowed to become a common carrier – that all interfaces are published and made as transparent as possible to all types of equipment.

"The most exclusionary tactic IBM employs," Sanders charged, "is to create uncertainty in the minds of users and competitive suppliers as to what can be expected vis-a-vis attachment of devices and subsystems which can be independently supplied."

"IBM capriciously manipulates device support, including shifting of logical elements (and associated costs) from one side of the interface to the other," the terminal maker claimed.

Sanders has already announced it will sue IBM on that point, a la Telex.

Holding Pattern

AT&T, meanwhile, told the FCC it "does not oppose" the proposed restructuring of CML to give IBM 55% ownership and Comsat a 45% share.

But Ma Bell did reserve the right to comment on the question of whether the proposal is in the public interest when CML gets around to filing for permission to actually build and operate a satellite system.

Very little about IBM-Comsat's specific plans was set out in the notice to the FCC, AT&T spokesmen noted.

"It would not be appropriate to comment on the public interest question now," they said.

Nevertheless, AT&T admitted the proposal raises some "foreseeable" questions. It listed first the problem of how many more satellite carriers should be franchised in light of the number already in existence.

AT&T also noted that the FCC has prohibited the common carriers – notably AT&T, GT&E and Western Union – from engaging directly in data processing business. Would these limitations be justified if IBM is allowed in as a common carrier? Bell asked.

Ma Bell evidenced no concern that IBM might use a foothold in the carriage market to develop all-embracing and "exclusionary" marketing tactics.

Western Union, in fact, raised the possibility that IBM's entry could in the end help make AT&T's position more secure against its numerous – if relatively tiny – new competitors.

"The probable evolution of this new market will be toward a rigid duopoly market structure, tacitly divided on a noncompetitive basis between IBM and AT&T," Western Union claimed.

User Learns Conversion Lessons Not Covered by the School Book

(Continued from Page 1)

shops with too much work and too few people." They started conversion about four months before the 145 arrived, and Accola sees now that it should have been an eight or 12-month effort.

The university had about 400 programs (grouped in eight major systems) on the 40. Although some programming changes were involved in moving to the 145, data conversion was a much bigger problem, Accola said.

He noted "many, many files" had to be shifted from 2314 to 3330 disk drives and from the "very slow" 800 bit/in. tape drives to 1,600 bit/in. 3420s. The tape file conversion probably included reblocking to take advantage of the greater storage available on the 145, but Accola didn't dwell on that aspect of the effort.

Everything has been converted except the payroll and student record systems, and even they should be done in time for the university to get rid of DOS by Nov. 1. At that time, Accola expects to be able to reduce the virtual : real storage ratio from its current 8:1 level, and that may alleviate some of the throughput problems he feels he has.

He had expected anywhere from a threefold to a fivefold improvement in throughput compared with the 360/40. Admitting it is hard to estimate how well the system is doing, he said he felt it "might be" as much as a threefold gain.

An IBMer has come to the center from San Francisco to review the system Accola generated and to make recommendations on how it can be improved. The IBMer pointed out that spreading the system and swapping areas across several packs (to avoid arm contention) was inefficient, since the IBM supplied coding was designed to work around that particular problem.

Even after DOS has been eliminated as one of the required operating environments, the university expects to keep VM/370 in order to support both OS/VS1 and the time-sharing CMS, Accola said. But he clearly was bothered by the overhead imposed by the system.

Accola has had 12 programmers working on the conversion and the installation of the time-sharing system. CMS has presented some problems, especially with the original emulator IBM provided. A new one just installed should solve the problems, Accola said, admitting, however, that he did not yet have confirmation of that hope.

As a result of all the work – by IBM and the university – and the new operating environment, the center has been able to cut its workday from 24 to 16 hours, Accola noted in conclusion.

Energy Conservation Basis of Home Test

WASHINGTON, D.C. – Conservation through computers is the Federal Energy Administration's hope with its Project Conserve. The program seeks to save energy with retrofitting or improving a home to reduce energy consumption and keep fuel and electricity costs down.

A computer is used to analyze the patterns of energy use for heating and cooling in individual homes and results reported to owners along with recommendations for improvement.

The program is under test in Danbury, Conn. and Topeka, Kansas. If the test is a success, the service may be expanded throughout the U.S.

Correction

In *Computerworld*'s Sept. 8 story on IBM's SDLC products, typographical and other errors which should be corrected are:

The 3767 is a successor to IBM's 2740 and 2741 terminals.

The 3767 terminals operate at 40 char./sec.

Under SDLC the 3767 transmits at rates up to 1,200 bit/sec.

The 3770s represent upgrades for users of 1050, 2770, 3735 or 2740 equipment.

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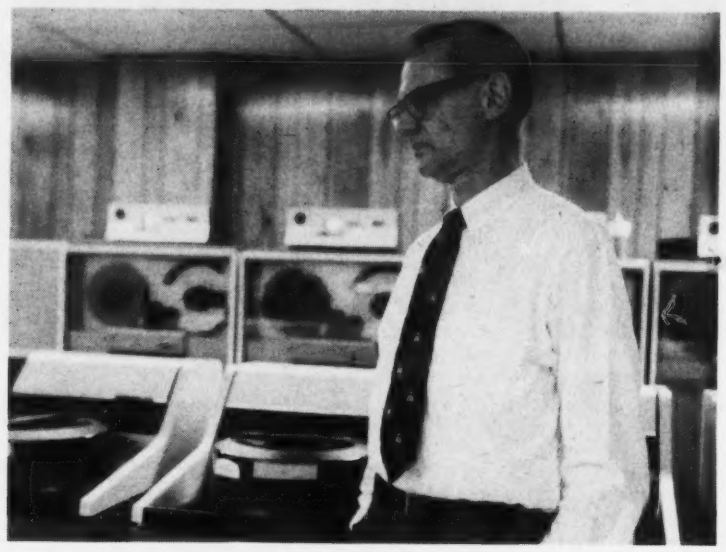
PHASE 4 OF SYSTEM LIFE: OPERATIONAL SUPPORT/MAINTENANCE



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Standards Agency Releases Physical Security Guides

(Continued from Page 1)

probability of any of these events occurring and combine this probability with the potential for loss to come up with an annual loss expectancy figure.

The next step would be to select the necessary remedial actions from a wide list of possibilities including changes to the environment of the computer center, improved controls over access and improved mechanisms for detection of losses.

In determining the possibility of natural disasters affecting a computer center, the Fips document said each installation should survey the amount and type of fire detection and extinguishing equipment it has, the location of the center in case of flood and its provisions for water damage and flood control equipment.

The security program should be initiated with a policy statement and a clearly stated manual of security procedures for the installation, the publication indicated.

Furthermore, the implementation phase should also outline specific procedures for systems development in secure fashion and provide for an ongoing security audit.

The installations should also protect themselves from faults or failures in their supplier utilities, including the power company and possibly their telecommunications supplier, the publication indicated.

Such things as voltage regulators and uninterruptible power supplies could be used if power fluctuations were expected to be severe or if they would seriously damage the installation, the report suggested.

In order to protect against failures in the telecommunications systems, some users may want to go to redundant telecommunications facilities, the report indicated, if the cost of a failure in the network could be more costly than the redundant systems.

The report also warned users to write software that would be designed to minimize the effects of a failure in the telecommunications network if they are heavily dependent on communications.

In order to optimize reliability of the computer center, the reports called on users to undertake a full analysis of the effects of any hardware failures and to estimate the loss expectancies in terms of system downtime from such failures.

In some cases, it said, centers may want to add redundant peripheral gear so that the failure of one piece of peripheral equipment will not stop the entire system.

Consider Barriers to Entry

In the area of physical protection from intrusion, the report stated that centers should consider barriers to entry and guards when necessary to keep out unwanted personnel and to prevent theft or sabotage.

Internally, the centers should identify areas of possible thefts or other losses and consider a "buddy" system where two people are needed to complete any particularly sensitive or exposed task.

These procedures should be formalized in areas of high risk and all installations should upgrade their employee screening procedures and their training in the security procedures, the report said.

In addition, all access to files should be controlled and traceable by later internal audits which should be conducted regularly.

In addition to the internal audits there should be a system to keep statistical analyses of possible danger areas or areas of system penetration.

Furthermore, program testing and documentation standards should be established to make the internal auditing easier, the study indicated.

All installations should also plan for any contingency and identify backup installations which could complete their work in case of emergency, the report stated.

In addition, it recommended that users occasionally use this backup facility just to test the procedures that would have to be followed in an emergency situation.

Copies of current files should be kept at a backup site, the report said, and every center should have a plan for reconstruction if destroyed, outlining all of its space, electrical, air conditioning and other needs.

Finally, the report said, all installations should develop programs to make their employees aware of security by publishing all regulations and establishing penalties for breaking the regulations.

Busing Boggles Boston DP

(Continued from Page 1)

children to schools throughout the city along the racial guidelines prescribed by the federal government," commented John Haran, systems analyst with the Educational Planning Center (EPC), the School Department agency responsible for wrestling with the logistics of desegregation.

Haran noted now that the two centers' 24-hours-a-day, seven-days-a-week summer schedule has been replaced by a more normal work week, long-range planning for complete implementation of the busing solution to the racial balance problem in Boston can begin.

"While we shuffled some 90,000 students around the city this fall, we haven't begun to desegregate schools in several communities," he said.

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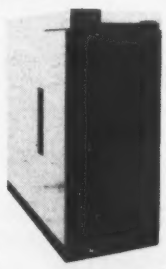

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House Republican Policy Group Announces Stiff Privacy Plans

(Continued from Page 1)

Goldwater Jr. (R-Calif.), outlined some points it would like to see in any regulations on data banks.

First, all rules pertaining to the collection and storage of information should cover data banks in both the public and private sectors, not just governmental data banks.

Noting that under the present system the "citizen must continue to give out large quantities for information but cannot protect himself or herself from its misappropriation, misapplication or misuse," the task force recommended:

- There should be no secret information systems with personal data.
- Information should not be collected without a clear need.
- Information should be appropriate to the purpose for which it was collected.
- Information should not be used unless accurate and current.
- Procedures should be established so that an individual knows what information is stored, knows the purpose for it, knows particulars about its use and dissemination and has the right to examine that information.
- There should be procedures so that an individual can erase or amend inaccurate, obsolete or irrelevant information.
- Organizations maintaining data banks should assure their reliability.
- Information collected for one purpose should not be used for any other without the consent of the individual.
- The Federal Government should not collect information except as expressly authorized by law.

The task force also called for limiting the use of the Social Security Number to the Social Security system.

The group proposed a cessation of funding for school systems that do not have a policy of allowing parents to inspect and correct school records of their children or that do not have a policy limiting the dissemination of such records.

In the juvenile justice area, the task force found "that with the use of computers, the juvenile's right to privacy is additionally threatened by the increased accessibility to his record and therefore increased possibility of misuse."

The group recommended stringent federal safeguards be inacted for such systems and that federal funding be withheld from any juvenile systems that do not meet the safeguards established.

The task force suggested legislation to require sealing of all arrest records not followed by convictions at the state level, as well as the prohibition of the "inclusion of arrest records not followed by conviction or computerized systems involving more than one state or using federal funds."

Furthermore, the group called for the Federal Government to supply "dollar grants and incentives" to states for the "voluntary adoption and execution of state plans to insure the right to privacy" in computerized medical information systems.

Careful review of any legislation concerning national health insurance will assure the "vast medical information network" created by such a plan has "stringent safeguards to prevent abuses of the patients' right to privacy."

Today, the task force found, "the individual possesses inadequate remedies for the correction" of abuses of individual privacy created by computerized information.

"Even if the individual is aware that data is being collected about him, he faces several obstacles if he wishes to expunge purely private information or to correct erroneous information."

"Among his obstacles are: the lack of statutory support for legal actions (except in the credit reporting area), the cost of litigation and even fear of retaliation by the company or agency being challenged," the report said.

"Despite their potential for abuse, data banks remain an inescapable fact of life in a society growing more complex and more technological. The task force does not oppose data banks as such, but favors strong safeguards against their misuse."

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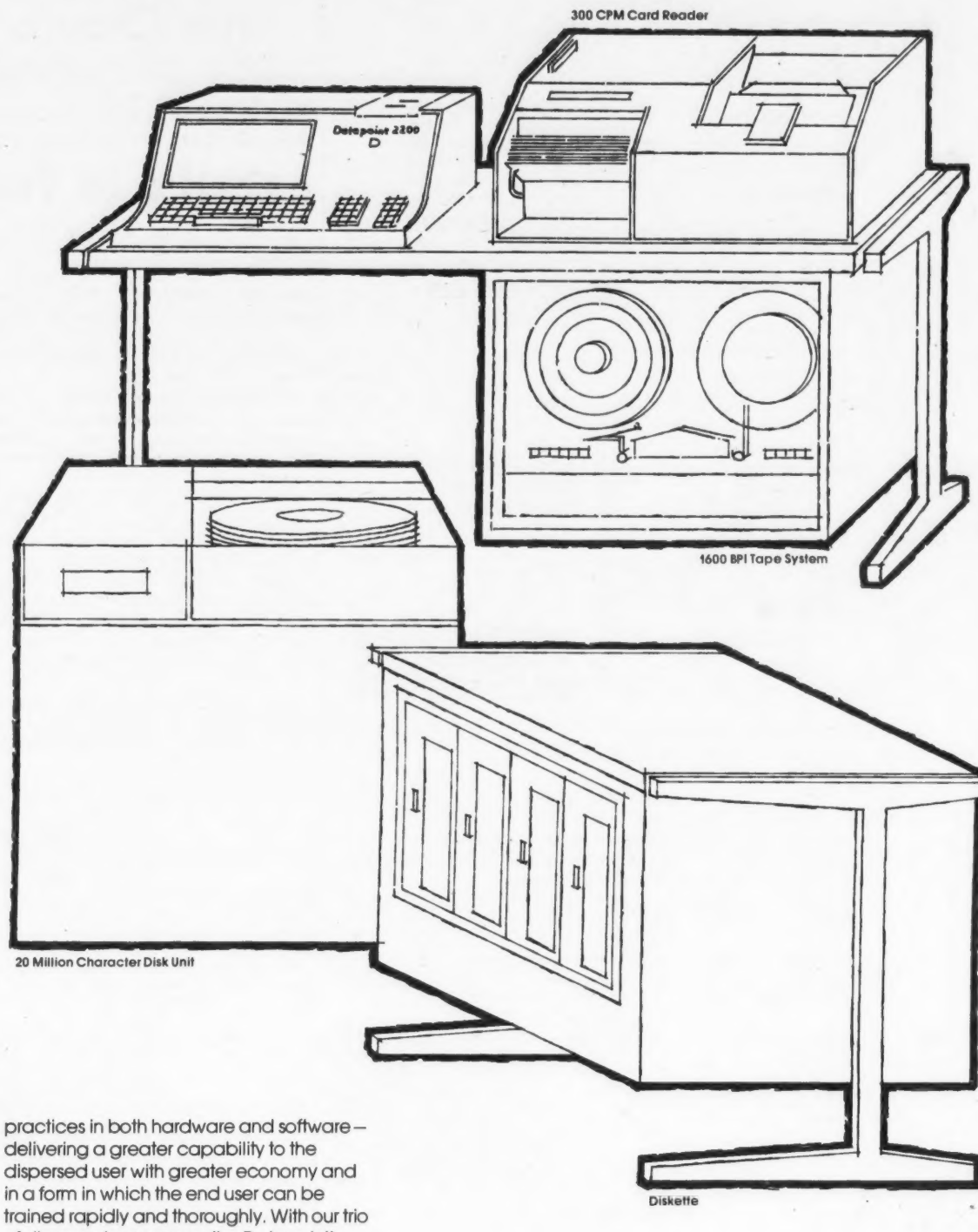

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Afips Sets Government Group

MONTVALE, N.J. – The American Federation of Information Processing Societies (Afips) has established a special committee to evaluate possible roles which the group might play in bringing together the professional societies of Afips and the various elements of government interested in computing.

Specifically, Afips hopes to improve its ability to assist the Federal Government by supplying technical advice and assistance, when requested, on computer-related issues, according to George Glaser, Afips president.

The Special Washington Activities Study Committee will also seek to improve communications among industry, academic institutions and federal agencies concerning R&D in computing and to supply information to the Afips constituent societies about federal activities and policies affecting the information processing field.

Dr. Frank B. Ryan, director of the House Information Staff of the Committee on House Administration in the U.S. House of Representatives, will chair the committee.

Societies/ User Groups

Asis-IIA to Focus on Products

ATLANTA – For the first time, the American Society for Information Sciences (Asis) and the Information Industry Association (IIA) will present a series of user workshops focused on the products and services available to the information community at their upcoming joint annual meeting here Oct. 13-17.

Arranged by Paul Zurkowski, IIA president, the workshops will provide an opportunity for users to talk to designers and producers of information products and services as well as with other users.

In addition to the workshops, technical sessions will explore the conference theme "Information Utilities" from the standpoint of regulatory policies, franchising and safeguards.

Additional information and preregistration forms are available from Asis at 1155 Sixteenth Street, N.W., Washington, D.C. 20036.

Calendar

Oct. 8-9, Washington, D.C. – **Eighth Annual Instrumentation and Computer Fair.** Contact: Instrumentation Fair, Inc., 5012 Herzel Place, Beltsville, Md. 20705.

Oct. 9, Cleveland – **Input/Output.** Contact: Cleveland Engineering Society, 3100 Chester Avenue, 44114.

Oct. 9, Washington, D.C. – **Computer Law Association Fall Meeting.** Contact: CLA, c/o Robert P. Bigelow, 28 State St., Boston, Mass. 02109.

Oct. 9-10, New York – **1974 Conference on Display Devices and Systems.** Contact: Thomas Henion, Palisades Institute, 201 Varick St., 10014.

Oct. 16, Toronto – **Annual Meeting and Industry Conference of the Canadian Association of Data Processing Service Organizations.** Contact: Ray Argyle, The Argyle Syndicate Limited, 47 Colborne St., Ste. 301, Toronto, M5E 1E3.

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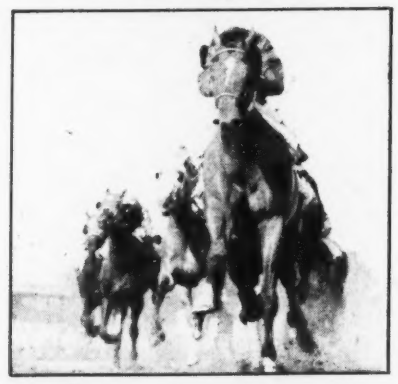

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'Human Touch' Lacking in MIS

By Toni Wiseman
Of the CW Staff

NEW YORK – "In seeking to refine our information resources, we have placed a too-large proportion of our chips on the technical side of the table and undercut the human relations [decision process] side," John D. Hogan of Nationwide Insurance Companies told a panel here recently.

"The initiative, concepts, electronic machinery and responsibility for MIS have been assigned to or drifted by default into the DP organization where only a part of the effort properly belongs."

"It's not technical expertise that's lacking," he added. "It's a case of MIS having been oversold. It's an illusion that you can't possibly have and hold."

The failure of MIS is not due to a lack of or need for improved information, he said.

Nor can inadequate technology be blamed, Hogan stated, since most firms have more computer technology than they can cost-justify.

"The failure of MIS to measure up to expectations probably is inherent in the nature of the need we are attempting to serve – the management decision process."

A company's information requirement structure should be diamond-shaped, not pyramidal, Hogan said.

Top management requires only general information to evaluate the company's performance, to provide a basis for plan revision and to indicate trends affecting strategy. It needs normative information to monitor performance against standards.

The middle management group requires the preponderance of general information to monitor performance of the annual plan, provide a basis for planning, direct research to problem areas and make the company aware of the social and economic environment, Hogan said.

Finally, at the clerical level, the requirements are for specific information to complete and verify transactions, check the performance of systems, respond to routine service requests and build and maintain files.

While there is some overlap in what information each group should receive, he added, information should be tailored to job responsibilities.

"A candid appraisal of MIS experience by various companies juxtaposed with a decent respect for the value of information in management decision-making says we have to improve the way we go about this," Hogan said.

Users must control development of their own information systems. The user's responsibility is secondary during design and development but primary during testing, installation and maintenance, he said.

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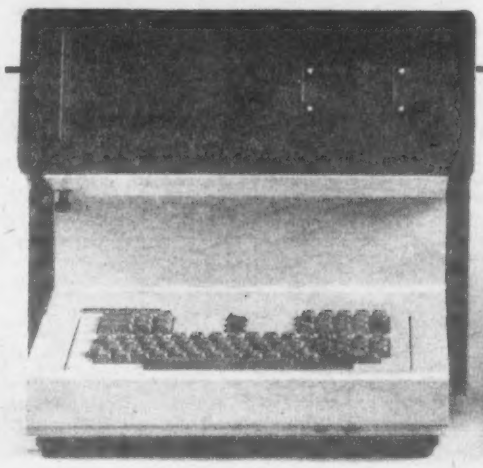

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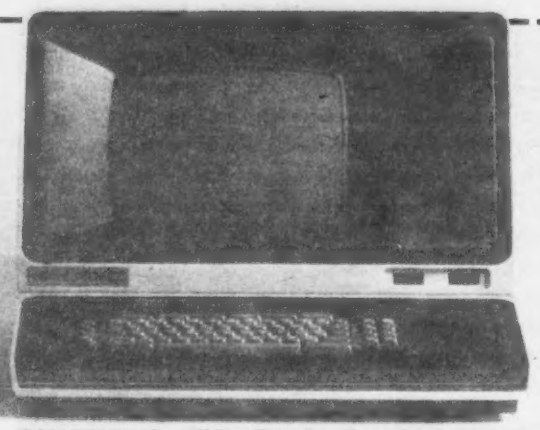

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Editorials

We're On to You, Ma

AT&T has frightened users and the public for years with claims the telephone network might be harmed by the interconnection of non-Bell equipment.

It has always been difficult to believe that anyone would purposefully make or use equipment that would harm such a national resource, and last week's *Computerworld* investigation shows that to be the case.

The *Computerworld* review of four years worth of Federal Communications Commission documents on this subject shows the Bell claims to be at least misleading, if not deliberate distortions.

In fact, the review indicates there are significantly more problems with the Bell portion of the network than with any of the independent gear that might be attached.

It is time for Bell to stop misleading the public and to get its own house in order.

Face it, Ma, interconnection is here to stay because it is good for the vast majority of the users; stop worrying unnecessarily about the other guy and get the phone lines working reliably again.

Dirty Work and Clean Machines

Computer users and designers contemplating major manufacturing projects clearly will have to be governed by public policy questions as much as technology.

The technology for such projects is here today, but concern on the part of labor unions and legislative policymakers will play an important role in the implementation of any such systems.

Unfortunately, this needed concern often is not evidenced until a project has already caused bitterness and dissention among workers and the general public.

If developed intelligently, however, automation of manufacturing operations can be beneficial to all.

Workers benefit because automation often replaces dirty or dangerous jobs; society benefits from increased productivity and lower costs of manufactured goods.

However, as Anthony Connole of the United Auto Workers has noted [CW, Sept. 25], these benefits must not overshadow the real concerns of the work force – perhaps a dirty job is preferable to no job at all.

Too often, as he also pointed out, the entire issue of displacement of workers is shunted aside with the assertion that in the long run automation creates more jobs than it displaces. But this argument offers little hope to the man being replaced.

Both computer developers and the top management of computer-using firms need to assess the hardships caused by their automation plans as well as the benefits that may accrue.

There is also a great need for more study and attention to this issue on a national level, either by the government or by nonprofit research centers.

Such study could develop realistic estimates of the job displacement that will be caused by automation over the next decade and could develop plans and alternatives to alleviate the suffering caused by such displacement.

Without rational planning for the increasing automation that is coming, a new generation of Luddites could reject out-of-hand all attempts to automate.

With some rational schemes, automation could be applied for the benefit of all in society.

We can only hope that planning for increased automation is not already too late to be effective.

Letters to the Editor

DP People Don't Look Too Good To Citizens of Washington, D.C.

After reading the story by Ron Frank regarding the voting mess in D.C. [CW, Sept. 18], I became highly upset. After all the years that television networks have worked satisfactorily with computers covering elections, someone comes along with an ill-designed, half-done system and completely destroys the credibility of the DP community in the D.C. area.

I find it hard to believe that a major manufacturer with the vast service bureau experience of Control Data Corp. (CDC) would be caught up in this mess, but there they are.

It seems to me that any competent systems analyst that has really worked with optical mark reading and/or optical scanning would have foreseen the quirks of an uneducated public in marking the ballots.

After all, how many times have you seen a sample ballot marked with an X or been specifically instructed that the X was all that was acceptable? How many times have you not voted for every office?

My experience tells me the application would have been handled much more satisfactorily on an optical mark reader (OMR) rather than a scanner. CDC should look to National Computer Systems (NCS) in its own city of Minneapolis for the OMR technology and expertise they seem to need.

The last I knew, CDC even supplied the processor for the NCS OMR.

Finally, the system just couldn't have been tested properly if it took three CPUs before anything ran at all close to being right.

Can you imagine how the image of computers and DP people look to the average citizen in Washington, D.C. right now?

Sam Budak
Systems Engineer

Datapoint Corp.
Minneapolis, Minn.

Harris Poll's Important Omission Inexcusable in Privacy Article

The story by Nancy French entitled "Privacy Top Concern of Americans" [CW, Sept. 11] overlooks the existence of the Fair Credit Reporting Act.

Shortly after the Harris Poll was released, Louis Harris wrote a partial admission of the mistake and we understand he sent a correction letter to all newspapers who carry the Harris Poll.

He said, in part:

"In doing research on the subject of privacy we consulted several books, articles and knowledgeable people in the field. Unfortunately, none of these sources brought the actual passage of Title VI to our attention. However, it was our responsibility to get all the facts and to know the area completely before reporting on it, and therefore we accept full responsibility for the error.

"We accept the responsibility for having goofed about the Fair Credit Reporting Act, but at the same time we stand by the validity of the results. In the near future, we will do another poll of credit bureaus and this time we will tell people about the Fair Credit Reporting Act first and see if the results change substantially."

It is difficult to understand how anybody dealing with this issue could overlook the existence of the act.

On another matter, the editorial "Privacy Commission Needed" makes a valid point. It is certain we all need to have more discussion on this issue simply because it is complicated and far-reaching.

John C. DuVal
Assistant Director of
Public Relations

Retail Credit Co.
Atlanta, Ga.

He Likes to Kiss and Tell

In reference to J. Dennis Omlor's article on his concept of the truth table in debugging nested IFs [CW, Sept. 4], I believe it would still be difficult to debug nested IFs even after "debugging" the truth table.

I favor the "Kiss (Keep It Simple, Stupid) method." This is still the best way to avoid maintenance problems.

David Schwartz

N.Y. Telephone
New York, N.Y.

Method Less Than Clear

The clarity of J. Dennis Omlor's article on nested IFs left much to be desired.

Perhaps he has a good technique, but it was difficult to tell from that article. Hopefully he teaches better than he writes.

Having been a user of Cobol for more than five years, I was frankly more confused by his method than any IF statement ever encountered.

William B. Gifford

Salem, Ore.

Staran Not Cheapest Way

Herb Grosch recently replied to some criticism with somewhat of a disclaimer as to depth of analysis that his political proddings have in back of them [CW, Sept. 4]. I, too, am a prodder, but I take strong exception to his recent praise for the Staran processor [CW, Sept. 11].

Anyone who has thought about the types of problems ballyhooed as being natural for the distributed processor of Staran finds these problems are solved as easily and significantly cheaper than distributed processing. Hardware has not yet reached the point where it is so cheap that no thought can be given to how to solve a problem.

Michael J. Viehman

San Diego, Calif.

Preprocessor Essential

Structured Programming Practical in Cobol Shops

By Martin A. Goetz
Special to Computerworld

There is usually a great distance between theory and practice. Structured programming is no exception. Current articles and courses on the structured programming discipline stress that it is a "technique" adaptable to any current language. In theory, that is certainly true.

In practice, extensions to any current language, be it Cobol, Fortran, PL/I or Assembly, are required to make the technique "practical." These extensions can best be accomplished through preprocessors to existing compilers or through macro capability facilities within a language.

In the case of Cobol, in particular, a preprocessor is a basic requirement if structured programming is to provide the benefits that have been predicted for it.

Structured programming preprocessors for Cobol do exist today and early experience shows a Cobol preprocessor enhances the chances of success with structured programming in a number of specific areas:

1. Structured programming coding is easier. Structured programming-coded applications are written directly in structured programming. There is no "pseudo code" or hand translation to Cobol. Reorganization of the pseudo code, currently necessary during hand translations, is also not needed.

Current IBM literature recommends that programmers write a pseudo code in which Cobol is extended to include the structured programming verbs. Then, to compile, IBM recommends manually transliterating the code to "structured programming-Cobol statements."

Hand translation is time-consuming and error prone, and either the code must be reorganized or GO TOs must be introduced. In either case, the code loses the "public readability" of its structured programming form.

2. Maintenance is simpler. Maintenance is performed strictly at the structured programming language level – the level in which the original solution was described. Where "structured Cobol" is hand translater from the pseudo code, maintenance must be performed at the Cobol level, and the pseudo code is quickly invalidated.

3. Structured programming syntax is expandable. Users of structured programming have found extensions to the basic structured programming constructs IF-THEN-ELSE . . . ENDIF and DOW HILE . . . ENDDO are useful. For example, the following additional constructs and programming conveniences have been implemented:

LOOP	Similar to DOWHILE but with processing before and after the test.
CASE	Similar to IF, but chooses among many alternatives.
CHAIN	The inverse of CASE; statements are executed until the first false condition.
LEAVE	Immediate exit from the current loop.
LEAVE-MODULE	Immediate exit from the current module.
FLAG, SETF, RESETF	Explicitly distinguish operations on control flags rather than data.

Since the preprocessor is macro or table driven, additional extensions can be easily implemented.

4. Modularization is expedited. The preprocessor allows modules to be organized in segments similar to the divisions of a Cobol program. Each module may contain an Identification Segment, a Data Segment and a Procedure Segment. Thus, data local to a module can be defined within the module.

5. Structured programming code can be audited. The preprocessor enables the structured programing code to be audited and analyzed, thereby ensuring that structured programming rules have not been violated.

These points present strong arguments supporting the practicality of using structured programming techniques in conjunction with Cobol – but only if a preprocessor is used. Without a preprocessor structured programming is likely to produce more problems than benefits.

Martin Goetz is a senior vice-president with Applied Data Research, Princeton, N.J.

Viewpoint

Fancy Frills, Not Power, May Mark Future Systems

The future of the IBM thrust was a matter of discussion and debate among IBM insiders for years before the introduction of the 370 Series. At no time were the Future Systems (FS) regarded as simply a repeat of the NS or New Systems, which turned out to be the 370s.

The question in regard to the NS was whether it was to be announced as a new series at all – or simply as further System/360s. But the FS Series was always looked upon as a different matter.

IBM leadership knew it would in the late '70s need a radically new approach to its markets to match its growth plans. It estimated that the development of such an approach would take five or six years and so selected 1977 as the first real year for the FS – provided that the 370s, with various mid-cycle kickers such as relocation, could last that long.

The Taylor Report
By
Alan Taylor, CDP

The idea of the FS revolution was based upon the abandonment of the "more bang for the buck" approach – otherwise called the "boxes" approach – in favor of selling complete systems.

These complete systems would really be complete, with the major programming for the application programmer already set into concrete by the hardware.

FS was to be oriented toward the user-operator, with operator terminals of one sort or another used extensively.

From the hardware angle, the pattern was fairly simple. A key element was to be the development of a universal controller, an apparently microprogrammed system which would permit the tailoring of the interfaces to match the specific application that IBM would be selling.

With this controller, user functions at the terminal end could be adapted to the application by adding special buttons or cosmetic ornaments on the terminals, such as systems that say "thank you, sir," in a female voice when the credit card being used belongs to a man, or in a male voice when the customer is a woman.

From IBM's manufacturing end the matter is fairly simple. The controller microprogrammer was to be adapted to whatever set of terminal function buttons and programmed cosmetics or complexities the user wants.

This is simple, good production control, similar to the current method of producing cars with the various options and color combinations a customer has ordered. I can see snags, but no real problems here.

Frequent Upgrades

From the traditional IBM marketing angle, with its constant push for increased rental revenue from each customer, the FS concept again looks good. If a customer wants to upgrade an FS operation he would have to change the hardware – and generally would have to pay IBM more for the new hardware.

He wouldn't – at least at the terminal end – be able simply to reprogram the system himself or to obtain a new system from an outside software house. He could obtain the new program itself, of course. But the terminal input wouldn't be available without cutting some more spaces for fancy buttons.

The IBM engineers will be able to develop modular boxes which can be converted in IBM plants from one version of the terminal to another, so the number of "builds" needed to keep the field supplied can be kept down by comparison with the number of "acceptances" of FS Systems, thus enhancing the product life while not hurting the marketing pushes.

Pricing Consideration

And the approach certainly has the virtue of novelty. It will be a radical departure, which is what the IBM leadership sought.

With this new approach each application can be priced separately, without concern for impacting other systems. IBM can supply one version of the system to a hotel chain at a high price while selling almost identical systems aimed at local taxi firms at a low price.

This maximizes the markets at which a system can be aimed, as well as its pricing structure. Previously, with prices organized on a power/buck scale, some small-ticket markets had to be ignored even though they were profitable simply because all the other markets that could afford to pay the higher price would have to be given the same price cuts, which the IBM philosophy would not allow.

But – despite all these advantages – I still see serious problems with IBM attempting to keep its leadership role as we now understand it with FS. I don't see it necessarily as something that will automatically knock out half of the current competitors, although others do.

. . . If in marketing FS IBM successfully turns the user's attention away from central processors, where IBM's great strength traditionally lies, then it is risking turning the central processor business into a wholesale price-sensitive one in which the user starts buying his applications off the shelf at retail discount stores or custom-designed at high-priced fashion stores.

(Naturally, it is possible that the competitors will knock *themselves* out by improperly marshalling their forces to face IBM – but that is another matter!)

Like a Fortune Teller

As I see it, the growth power of IBM, like that of a fortune-teller, has been the pull of the mysterious, dangerous and yet attractive future. Next month or next year, the user feels, he will have the system producing gold-plated printouts.

But, at the same time, a warning comes to the fore: those gold-plating systems will work only if IBM's great strengths and inside knowledge are used to keep the system's functional externals in tune with changes in the IBM-provided operating system or the IBM-controlled interfaces or some other point inside the sphere of IBM control.

The FS system, relying as it apparently does upon the fixing of the user's application through tailored controllers and terminals, exposes the customer to competitive system suppliers every time he considers a terminal change. The functions themselves will be almost as easy for competing specialized suppliers to provide as IBM, which has to talk in giant volumes.

The fight will come down to simple price competition and button design.

In both areas, price and design, organized industry specialist firms can be expected to give IBM a good fight where the IBM strengths of future mystery and operating system control will be as useless as tanks in the jungle.

And, in the FS time frame (1976-1984), IBM's competitors will be able to concentrate upon the terminal market. For computers they will be able to use the coming packet-switching and other distance-independent computer networks without requiring a customer to have his own in-house DP system.

In other words, if in marketing FS IBM successfully turns the user's attention away from central processors, where IBM's great strength traditionally lies, then it is risking turning the central processor business into a wholesale price-sensitive one in which the user starts buying his applications off the shelf at retail discount stores or custom-designed at high-priced fashion stores.

Straws in the Wind

So much for guesswork – and most of what is written above *is* guesswork, based on the various IBM documents that are part of the public record and include top-level materials as recent as 1972.

But we don't have to guess what IBM has been doing recently. Part of the FS plan provides for testing of system prototypes during the 370 era. I think a number of recent IBM products and plans for their use will offer good evidence as to whether the user can count on the IBM umbrella over the next few years.

A final report on the FS systems as seen from a present-day perspective will address that question.

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SOFTWARE&SERVICES

Random Notes

Supervisor Shifts Backed Under 'Multi-DOS' Utility

ALIQUIPPA, Pa. – Multi-DOS Version 2 from University Software, Inc. is designed to allow the DOS user up to nine different supervisors on the same SYSRES pack.

The utility lists the available supervisors on the console and then responds by loading the operator's choice, the company said.

Multi-DOS permits the user to test newly generated supervisors with a fallback available if the test fails. It also encourages the use of supervisors tailored to special jobs or stripped of unneeded facilities, leaving more room for application coding.

The utility is available for $100 from 221 Princeton Drive, 15001.

NCR Adds Proof of Deposits To CIF System For Bankers

DAYTON, Ohio – NCR has released Micr-oriented Proof-of-Deposit application software for use with its commercial bank central information file system on 48K Century 101s or larger CPUs.

Primary functions, beyond proof of deposits, include validation of "on-us" transactions, pocket distribution, float analysis and cash letter preparation, NCR said.

Parameter cards control the the transit, application, transaction code and account number tables. These entries may be changed at program load time.

The new software is available free to Century users.

Real Estate Finance Control Managed In-House or on SBC

CHERRY HILL, N.J. – Institutions funding real estate developments can run calculations, generate reports and forecast future trends with the ANS Cobol loan accounting and forecasting package from Computer Dynamics Corp.

The system may be run under OS/360 or TSO or accessed on the Service Bureau Co. (SBC) network.

Applications include accounting for loan balances, interest billing and receivables. Forecasting covers cash flow projections, proforma balance sheets and profit and loss statements.

In-house users can acquire the basic system for $30,000 plus customizing. Users on SBC pay a front-end charge of $6,000 for tailoring plus normal network charges. Computer Dynamics is at 401 Cooper Landing Road, 08034.

Correction

Purchase price of the Retrace package for debugging BAL programs under OS/360-370 [CW, Sept. 11] is $2,000 including both source and object code, according to the vendor, RRC International.

Honeywell Backs User-Built Software

● IAA 'Taking Off' After First Year

WELLESLEY HILLS, Mass. – A year after its formal launching, Honeywell's Industry Applications Acquisition (IAA) program is "now beginning to take off," according to IAA manager James H. Bassett. IAA is the apparatus through which Honeywell will acquire marketing rights to successful applications developed at customer sites or by independent software firms.

Designed to expand the firm's software offerings beyond those its central programming staff can develop, Honeywell's IAA is both similar to and different from IBM's Installed User Program (IUP) approach to the same basic problem.

Programs under IAA include applications written by customers to support their application requirements and programs written by Honeywell systems engineers in support of user applications. But IAA also includes applications from non-Honeywell users converted to run on Honeywell systems, Bassett noted, and referral services permitting users to negotiate directly with independent software developers to get a job done.

Though users may be able to find a market for their home-grown applications through this program, clearly Honeywell is not using IAA to get hold of software indiscriminately. Bassett's main job this past year has been to define the scope and organize the procedures of the program.

Honeywell now has 14 applications packages available to users under the program. Another 30 are being considered as possible offerings, Bassett said, adding that he expects to increase the IAA listings to cover "as many as 40 by the end of next year."

Various application areas and a mix of hardware systems are supported by current offerings.

IAA applications are separately priced and Honeywell generally pays a royalty to the developer, Bassett noted.

● Scheduler Eases Multiprogramming

WELLESLEY HILLS, Mass. – Medium- to large-scale Honeywell 200/2000 users running multiprogrammed production jobs can apparently get a broad range of operations support capabilities with the Computer Scheduling System (CSS) expected to be available from Honeywell later this month.

Newest of the user-developed programs to be offered under the Industry Applications Acquisition (IAA) program, CSS seems to confirm the program's maturing. The package cuts across industry lines and supports the user's DP operations more than a particular application.

CSS can, by itself, manage job scheduling, run-time preparation and "clean-up" work after the job. However, it also allows operator intervention to optimize the job streams in the light of events beyond the control of the scheduler logic, Honeywell said.

The system generates a proposed schedule covering both upper and lower partitions for any requested time frame and reports systems resources still available.

The operator might assign these to utility functions which are not normally carried in the master schedule.

Developed by A.E. Staley Mfg. Co. of Decatur, Ill., CSS also generates tape library lists, library cards and "pull lists" for the librarian, tape handlers' schedules and printed labels for marking output tapes. Job Control Languages (JCL) entries to activate each job scheduled are also produced, Honeywell noted.

CSS is written in Cobol and runs in "about 100K" under OS/200 or 2000. As with most IAA offerings, it will be available for a one-time fee or a limited number of monthly rental payments.

Accounting Applications Linked With Data, Operator Integration

SAN DIEGO, Calif. – The Integrated Financial Services (IFS) system from Infonational is made up of financial application programs molded together to function as a single system. It is, the vendor claimed, "uniquely suited" to serve as a commercial business services package.

Financial applications available in the modular system include general ledger, accounts payable, accounts receivable, fixed assets accounting, payroll and personnel. Subsystems of general ledger are said to include cost allocation and budget generation support.

In similar fashion, subsystems under accounts payable include standard cost variance and check reconciliation routines. Under accounts receivable, users can include a sales analysis subsystem.

Two levels of integration mark IFS operations, the vendor noted. Data integration is distinguished by the use of a single central information data base to support the sharing of information between applications. Operations integration is the term Infonational uses to categorize its efforts to limit – or eliminate – interventions by the DP staff once the job is running.

To provide operations integration, IFS includes an input processor, an output processor and a billing module. The input processor allows data for all applications to be entered through one entry routine, at which point it is validated and directed to the appropriate application system.

The output processor gathers all reports together into a single group for each client processed. This approach results in a neat package which can be handed to a delivery service, microfilm operation or directed to output terminal devices.

The billing module accumulates statistics and prints invoices to customers for the DP work just performed. This routine can be interfaced directly with a DDA application.

The complete IFS system, written and distributed in Cobol, runs in 96K on an IBM 360/370 and is available for $93,000 through P.O. Box 82477, 92138.

Package Optimizes Disk Space

CUPERTINO, Calif. – An operations manager may have better control over how effectively an installation's disk resources are being used by installing the Disk Scratch utility program from Practical Systems.

The software scratches all unwanted data sets but also lists the volume table of contents of selected volumes.

The utility operates under IBM's OS or OS/VS environments. It is intended, the company said, to replace the IBM-supplied process of using IEHLIST to determine which data sets should be scratched and then using IEHPROGM to perform the scratches.

In operation, the Practical Systems package scans designated disk volumes and scratches all data sets which do not belong to one of seven basic categories. The protected sets include those specifically shielded by the user, those created today and those qualified by SYS1, as well as the system catalog, Vsam data sets, data sets qualified by installation-specified names and password-protected data sets.

The names of data sets to be protected form the primary input to the system. New names are validated and then merged into a single internal table which can accommodate 200 entries.

Output includes separate lists of the data sets that have been protected and those scratched. It also shows the minimum number of tracks released by the scratch action.

A secondary output is available for the listing of selected volumes' table of contents, a spokesman reiterated.

The package costs $950 from the vendor at 21060 Homestead Road, 95014.

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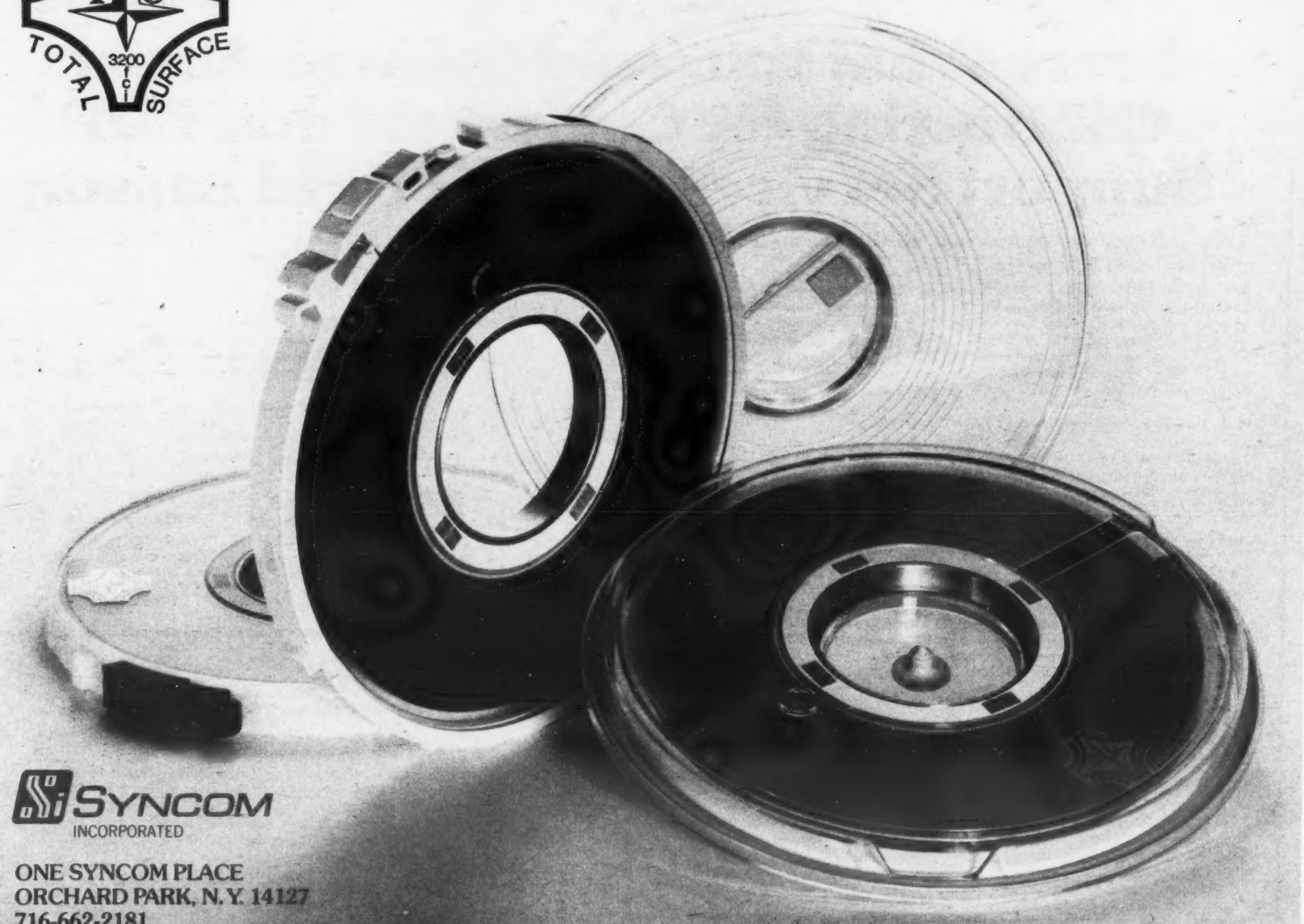

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Modular Approach to Complete Project Seen Key to Meeting Time, Dollar Goals

By Edith Holmes
Of the CW Staff

NEW YORK – The modular approach to project planning, organization and implementation often provides management with the best means of meeting programming costs and time constraints, speakers told an Info '74 session here recently.

By breaking a project down into smaller parts, management can more easily get a handle on the expense of the undertaking, both in terms of time and money, the panelists said.

Long before DP management begins actual work on a particular project, however, the goals the end user expects to achieve must be understood, according to Richard L. Caplan, senior consultant for Advanced Computer Techniques Corp.

"Our biggest problem is the failure to comprehend the external view of a programming project, the view of the person or organization who has asked that the project be done," he said.

"All too often we fail to produce the 'right' product, the product that fulfills the end user's needs."

Calling for more explicit definition of these external specifications for the technical people who write the programs, Caplan noted a clear understanding of a project's purpose at the outset also gives management a way to measure its success.

Once management has defined its aims and determined how the people assigned to conduct the project should be organized, it must decide on a means of engineering software development, Caplan commented.

In addition to creating a clear task statement, coherent project phases, communications channels and significant milestones, he suggested management consider the advantages of the modular approach to software engineering.

Easier to Control

"By cutting the project into pieces, management will make better use of its programmers because they will be able to handle concurrent tasks," he said.

"Design improvements are likely to result because, in order to modularize their approach, those in charge will have to define objectives clearly."

Not only is it easier to control a modular project, but the application of modules decreases the number of program paths to be debugged, Caplan said.

He conceded this approach has some disadvantages: the lack of a simple design model, the possibility that changing one module will affect a string of related units, the need for more complete documentation and the chance that the module developed for a particular project may never be used again.

Despite these drawbacks, Caplan endorsed the modular concept in general and particularly stressed the value of structured programming, a form of modular programming development which, he said, involves "the controlled use of unconditional transfer instructions, the rigorous limitation of the size of modules, a top-down design and testing of components and an overriding concern that the form of the modules developed follow an appreciation for their function within the program."

In the structured approach, program coding should reflect the designer's intent, according to Caplan. He noted such formal coding represents a departure from the typical approach to programming.

Could Be Worthless

While agreeing that the mod-

(Continued on Page 15)

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'Facs' Eyes Bank Costs, Profits

EL SEGUNDO, Calif. – A system designed to give commercial banks, "thrifts" and other financial institutions with substantial 360/370 capability better control over the financial aspects of their operations has been announced by Computer Sciences Corp. (CSC).

The modular system, called Financial Accounting and Control System (Facs) includes support for conventional accounting applications as well as cost accounting and profit analysis.

Primary module is the automated accounting system for general ledger, responsibility and budget accounting, and cost analysis and allocation. The ledger work provides daily and monthly reports of transactions, errors and adjustments, and trial balances.

The basic logic also produces income statements, comparative statements of condition and ratio reports. The responsibility reporting feature compares actual dollar values with planned values for asset, liability, income and expense accounts.

Budgeting and profit planning functions are assisted by Facs-prepared historical reviews, budget projections and worksheets. The cost analysis and allocation function reports product line costs and profits and allocates costs according to management-defined criteria.

Measurement of the contribution of individual or grouped profit units includes a reporting of the source and use of funds and allocation of support costs, the vendor added.

Written in ANS Cobol '68, Facs is operational in "about 100K under DOS or OS, and in a DOS/VS environment as well. There appears to be nothing that would prevent it from running under OS/VS1 or VS2 as well, a spokesman added.

The complete Facs package, with all modules, source code and supporting documentation, is available for $50,000 from CSC at 650 N. Sepulveda Blvd., 90245.

Modular Approach Works for Projects

(Continued from Page 14)

ular approach can be valuable, Leonard H. Aptman, associate professor of the Graduate School of Business at Iona College, contended the technique is worthless without sufficient external management.

He argued that only through the assumption of responsibility and authority can management succeed "in attaining its project objectives through the use of available resources."

While Aptman would not come out in favor of matrix organizations, he did say this shared approach provides a reasonable alternative to directed and full responsibility structures.

In addition to urging managers to make themselves available to those working on a project, James R. Cumberpatch, executive vice-president of Program Control Corp., stressed the need to identify project problems early and to maintain "the fragile communication lines into upper management."

The task of any project group is threefold, according to Cumberpatch: bring a project in on schedule, within the allotted budget and with the product requested.

He suggested project management employ a "baseline," a plan used throughout the project as a basis for measuring deviance from time, cost or project goals.

"Regardless of the kind of organization you choose for accomplishing the proposed task, you need to have a current, up-to-date plan where actuals are collected for comparison with the baseline," Cumberpatch said.

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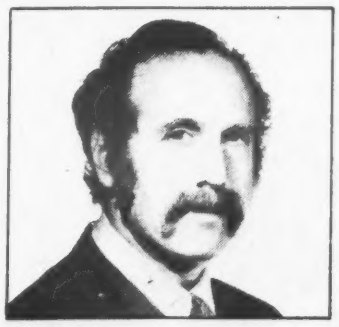

We selected this seminar for inclusion in the EDP Seminar Series after watching it in action. It was developed by Performance Development Corporation under the direction of its President, Leo J. Cohen, a nationally known consultant in data base systems. Mr. Cohen will continue as seminar director, and the seminar leaders are PDC staff who are experts in their own right. They include Alan Stutz and Steve Robinson, both of whom are well-known for their work in this area. All instructional staff have been involved in design and implementation of a variety of data base systems for major U.S. computer-using organizations.

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IBM SDLC Terminals Entail Subtle Network Changes

By Ronald A. Frank
Of the CW Staff

NEW YORK – The introduction by IBM of two Synchronous Data Link Control (SDLC)-compatible general-purpose terminals [CW, Sept. 18] includes some subtle network configuration changes that are bound to affect tomorrow's data users.

The 3767 and 3770 are designed to replace the 2741 and 2770 families and, as such, they represent an improvement for start/stop and remote batch users. But their interaction with SDLC hardware and software seems to be more of a concession than a shift in IBM's communications approach.

It is generally acknowledged that the real benefits of SDLC will accrue to users with large point-of-transaction requirements and who need to continuously transmit data for inquiry/response or similar on-line applications. In this type of environment the previously introduced IBM industry-oriented terminals subsystems for banks, supermarkets and retail stores are still the best suited for full-duplex SDLC.

The addition of the new slower speed devices will allow users to interface start/stop and binary synchronous terminals into their networks without greatly improved performance per terminal. But SDLC will allow a higher number of these terminals to be supported per network even though this improvement may not be enough of an incentive to make remote batch or interactive users switch to the new link control.

Standard Relationship

The most significant part of the IBM announcement involved software and a new term for SDLC users called Systems Network Architecture (SNA).

Within the SNA title, IBM has standardized the relationship between its Virtual Telecommunications Access Method (Vtam) and the Network Control Program NCP/VS with "additional primary levels of support," according to Paul Lindfors, manager of advanced communications systems architecture at IBM's Raleigh, N.C., telecommunications center.

One of the major changes outlined by Lindfors is a SNA requirement that the interface between Vtam and NCP remains in the 370 virtual mainframe. Earlier statements from IBM communications experts had indicated that some of the Vtam modules might be moved out of the CPU and into the 370X front end.

This approach was discounted by Lindfors, who said the access method would control applications programs within the mainframe while NCP would be responsible for message handling and scheduling.

At the same time, two levels of SDLC control have been added to the NCP interface. The first new level is designed to add routing problems that may arise in a 370X or other SDLC control unit when multiple lines and devices are supported.

This "level of programs" is called path control and is used primarily for the routing of data within the system. The path control works with header information on individual SDLC messages and carries addressing information throughout the entire network.

Analysis

The next level to be added is called Request/Response and includes "the form of interface created within the CPU for messages," Lindfors explained. This level controls the sequence in which requests and responses will be handled by the SDLC line. The correct sequence required by a user will depend on the application, he said. This level is created by additional message header control information used at both ends of the communications system.

In the mainframe the three-level support will occur on the NCP side of the NCP/Vtam interface. Previously the NCP support included only a primary Data Link Control level; the Path Control and Request/Response have been added.

This three-level NCP support is carried through in each network device to create a common NCP interface hierarchy within a network, Lindfors said. The main responsibility of the NCP lies in system error recovery in addition to its compatibility with the three-level interface support, he added.

All of IBM's teleprocessing programming support will be organized around Vtam/NCP. This will apply to new products as well, Lindfors revealed.

As a "migration tool" IBM will support Btam and earlier non-SDLC terminals through the Partitioned Emulation Program Extension or PEP mode of operation. This earlier equipment will operate in conjunction with the Vtam/NCP programming on 370 mainframes, but not on 360s.

Needs Technical, Service Adjustments

Bell Picturephone Unsuitable as CRT Replacement

Early in 1971, Alcoa was one of the first companies to utilize AT&T's Picturephone as a CRT terminal. The firm installed several of the Bell units for officers to access a management information system on a 360/65.

After a two-year trial period, the Picturephone units were replaced with conventional CRTs. Today Alcoa uses Ultronic, Hazeltine and Adds CRTs to access a 370/158. This article reviews why Picturephone was not an ideal choice for displaying computer data.

By Michael L. Coleman
Special to Computerworld

Although Picturephone was heralded by AT&T as a multifaceted device, the unit was optimized for face-to-face communications and therefore was unsuitable as a CRT replacement.

This lack of suitability explains the fact that the public regarded the cost of the Picturephone unit as high. In fact, the unit itself rented for $70/mo, which at that time was very competitive with CRT units but rather expensive for a telephone replacement.

It was not accepted as a CRT replacement for two reasons: the small screen size (22 lines of 22 characters each) and the high bandwidth required for communications with the computer.

The 360/65, through an IBM 2701 controller or its equivalent, would transmit to a Bell 305 data set which would generate and store the character images and transmit them through the Picturephone switch to the user's unit. This meant that while any Picturephone could access the computer, one 305 data set (at $275/mo) was required for each port on the computer.

Another reason for its lack of acceptance was that there were very few Picturephones in use at the time; there was no one to call. This was caused in part by the corporate philosophy of treating the Picturephone as a status symbol. The Picturephone was reserved initially for the senior corporate officers when, in fact, the people with need to access a computer and to communicate within the company were the lower level management.

The last reason for its lack of acceptance was the unavailability of intercity service. The Picturephone was heralded as a replacement for long distance travel; a person could communicate with his home offices on a Picturephone and achieve face-to-face communication without traveling several hours in an airplane. But the intercity service never came about.

In addition, Picturephones were not made available in New York City because of the problem New York Bell was having with its regular telephone service.

What must change? Certainly the Picturephone that now exists must be expanded so that the unit is a true communications tool. This means that it should be effective as a computer terminal.

Viewpoint

It would seem that this necessitates an electronics change so in a constant bandwidth the scan rate and the number of lines can be automatically varied. For face-to-face communication where the resolution is not critical but the scan rate is, a rather low resolution with a large number of scans per second would be used.

But when it was desired to view microfilm, for example, where the resolution is absolutely critical but the scan rate is not, a very high resolution but rather few scans per second would be available. This would require a unique phosphor which would maintain the picture with a low scan rate, but not blur with the high scan rate.

Character generators must be built into the Picturephone. It must be able to access computer ports without the expense of switching high bandwidth signals for the relatively small number of characters that are actually transmitted to and from the computer.

Finally, the communication facilities must be available for intercity service.

The cost of the Picturephone unit itself

(Continued on Page 18)

Task/Master Supports SDLC Units

NORWALK, Conn. – Turnkey Systems, Inc. (TSI) has announced extended terminal support for Task/Master and related telecommunication products, enabling the teleprocessing monitor to interface with all IBM Synchronous Data Link Control (SDLC) devices.

A free upgrade of all extended feature and OS monitor versions, and extended terminal support, will be compatible with existing support under Task/Master, the firm said.

The company added that use of its interface on an IBM 3704 or 3705 communications controller or equivalent device will provide support of Network Control Program functions.

In addition, TSI said Task/Master will continue to support non-IBM front-end processors and terminals in any combination with IBM devices.

Extended terminal support for its monitors will be available to users four months after the specifications of each IBM advanced function terminal are announced.

Located at 111 E. Ave., 06851, the firm will deliver the support four weeks after the order is made.

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Large Screen CRT Terminal Available in Two Formats

BLUE BELL, Pa. – Univac has introduced a large screen CRT terminal called the Uniscope 200 which can display up to 1,920 characters on a 15-in. green phosphor screen.

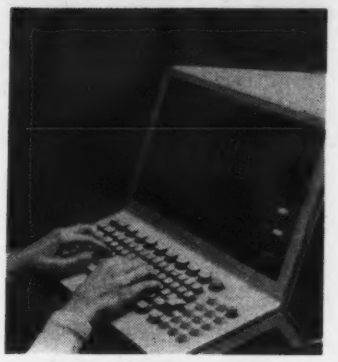
Displaying a 7 by 9 dot matrix character, it is available with either a 24 line by 64 char./line or 24 line by 80 char./line format.

The Uniscope 200 may be used as a receive-only or as a receive-transmit terminal with a variety of keyboards. The operator can control the intensity level of the characters, a spokesman said.

The new large screen display is compatible with Uniscope 100 installations, using the same software, he added.

A range of peripherals supported by Univac is available for use with the terminal.

The display will be available at no extra cost in six special language sets besides its domestic U.S. version. These are Spanish, French, German, Swedish, Danish and a version for the United Kingdom.



Univac's Uniscope 200

Lease prices for the basic Uniscope 200 begin at $126/mo including maintenance. It may be purchased for $4,278. First customer deliveries are scheduled for this month.

USF Sets Symposium on Nets' Impact

WASHINGTON, D.C. – A three-day symposium on the impact of computer-communication networks will be held in Chicago on Oct. 14, 15 and 16.

Sponsored by the University Sciences Forum (USF), the seminar will cover user needs for computer networks, current and future hardware and software technology available for networks and methods of system performance measurement and evaluation, a USF spokesman said.

He noted the Arpanet, including a recent measurement of its performance, will be described and used as a contemporary example of a communications network.

Billed as a meeting for computer scientists, operations analysts, engineers, mathematicians, communication scientists, managers and executives desiring an increased understanding of the impact of communication networks on data communication needs, the symposium will cost each attendee $375.

The seminar will be held at the Rodeway Inn near O'Hare Airport.

Further information may be received by contacting the Seminar Registrar, University Sciences Forum, 1700 K Street, N.W., Washington, D.C. 20006.

Picturephone Not CRT

(Continued from Page 16)

was really quite acceptable – $70/mo – but the intercompany service cost $110/mo. This must be reduced.

Michael Coleman is a project leader in the Management Information Services Division at Alcoa.

Our Data Communications Seminar covers SDLC, HiD-LoD, DDS and other things that weren't even heard of a year ago.

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- HiD-LoD – Bell's newly effective tariff for voice lines.
- DDS- Bell's new all-digital data network--principles of operation and prices
- Newly approved major revisions to WATS
- Impact of Satellite Carriers and Specialized Carriers
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All participants in the seminar will keep the seminar workbook—a 2-volume loose-leaf outline of all course materials prepared by ICC Institute. You'll also receive a copy of "Data Modems Selection and Evaluation Guide" by Vess V. Vilips, and a "Data Communications and Teleprocessing Dictionary." *PLUS* you'll get free update materials for one year--just to keep you ahead of tomorrow's changes.

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Dr. Dixon Doll, the highly respected teleprocessing consultant, leads the expert faculty at this seminar. Dr. Doll has his PhD in Systems Engineering from The University of Michigan, and many years of experience in this field as a consultant and educator. He has taught graduate level computer systems design, and has served as a professional consultant to such firms as IBM, Raytheon, ICC and MCI. Dr. Doll takes an active part in the entire seminar.

You should attend this seminar, if:
- You are currently involved in data communications on a management or operational level and wish to expand your knowledge of the field.
- Your company will be going into this field in the near future.

Charges and Enrollment
The total cost for this two-day seminar is $350, including workbook, reference materials, year-long update service, luncheons and continental breakfasts. This does not include hotel rooms, if necessary.

To enroll, look over the schedule below, fill out the coupon and send it in. Remember, enrollment must be limited, so don't wait until it's too late.

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IBM's First Delivered 3650

Arkansas Store Installs 'Wanded' POS

LITTLE ROCK, Ark. – The first retail store system to be delivered by IBM has been installed at Dillard's department store here. The system features electronic wands at sales counters to ring up purchases.

The IBM 3650 system has point-of-sale (POS) terminals that combine cash register functions with those of a computer entry device. Dillard expects the system to reduce the time needed to complete customer transactions and provide sales data to buyers to help them maintain as adequate supply of desired merchandise.

The system includes 50 terminals with hand-held wands that read magnetically encoded price tags containing the description, price and stock data on the merchandise. They are located at sales counters throughout the store.

'Wands' Each Item

To begin a typical cash transaction, a salesperson enters an identification code on the terminal and passes the hand-held wand reader over the thin magnetic stripe on a price tag, without removing it from the merchandise. As the clerk "wands" each item in the purchase, the terminal automatically records and prints information describing the item and displays the price on a lighted panel.

To complete the purchase, it computes the amount due including applicable taxes, calculates the change to be returned and prints a cash receipt and a journal tape.

At the same time, the terminal captures essential item information such as merchandise class, size, color and price for inventory control.

In departments where merchandise is not "wanded," the clerk can ring up a sale on the terminal's keyboard.

Information captured by the wand or entered manually is transmitted by telephone lines to the firm's central computer, an IBM 370/145, located at the administrative offices three miles away.

By tracking each day's transactions, the mainframe provides management with an advanced inventory control system.

With detailed information about the previous day's sales, the store can provide buyers with sales data five days faster than before, a spokesman estimated.

The coded tickets are produced automatically from data stored in the computer at the time buyer's orders are entered.

Dillard's has also installed IBM 3277 display stations in its distribution center to eliminate paperwork associated with the execution of buyer's orders.

The orders are entered at the display units and all actions associated with the merchandise cycle are performed at the station's keyboard and display screen.

Portable Data Terminal Introduced by Randal

TORRANCE, Calif. – Randal Data Systems has introduced a portable data terminal with a nonimpact thermal printer operating at 10-, 15- or 30 char./sec with a built-in solid-state acoustic coupler.

Standard features include switch-selectable half- or full-duplex transmission mode, single- or double-line spacing, auxiliary EIA RS-232C interface capability, upper- and lower-case and full Ascii keyboard.

Purchase price is $2,590 and lease prices start at $85/mo including maintenance. Randal is at 2807-F Oregon Court, 90503.

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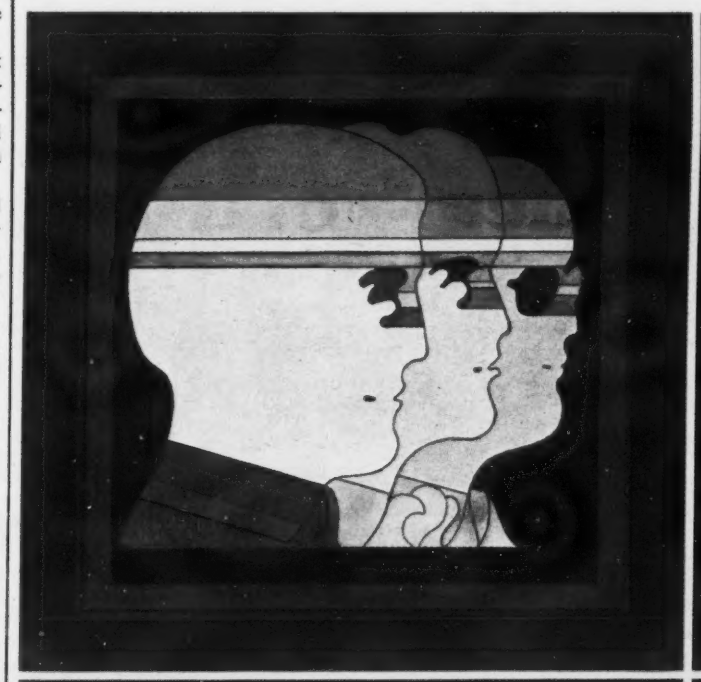
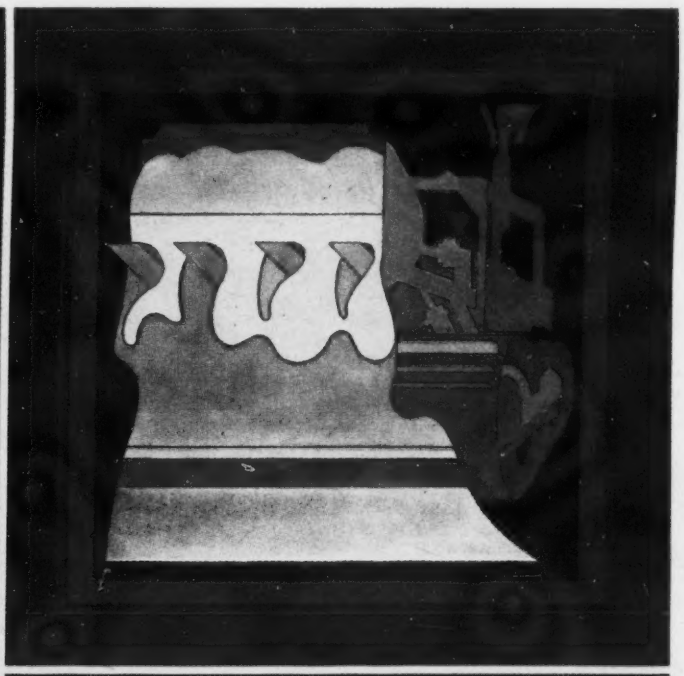
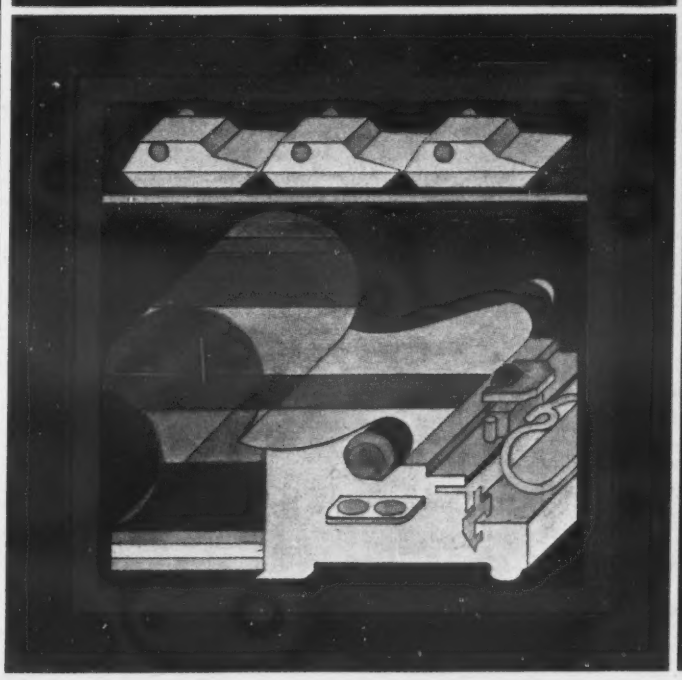

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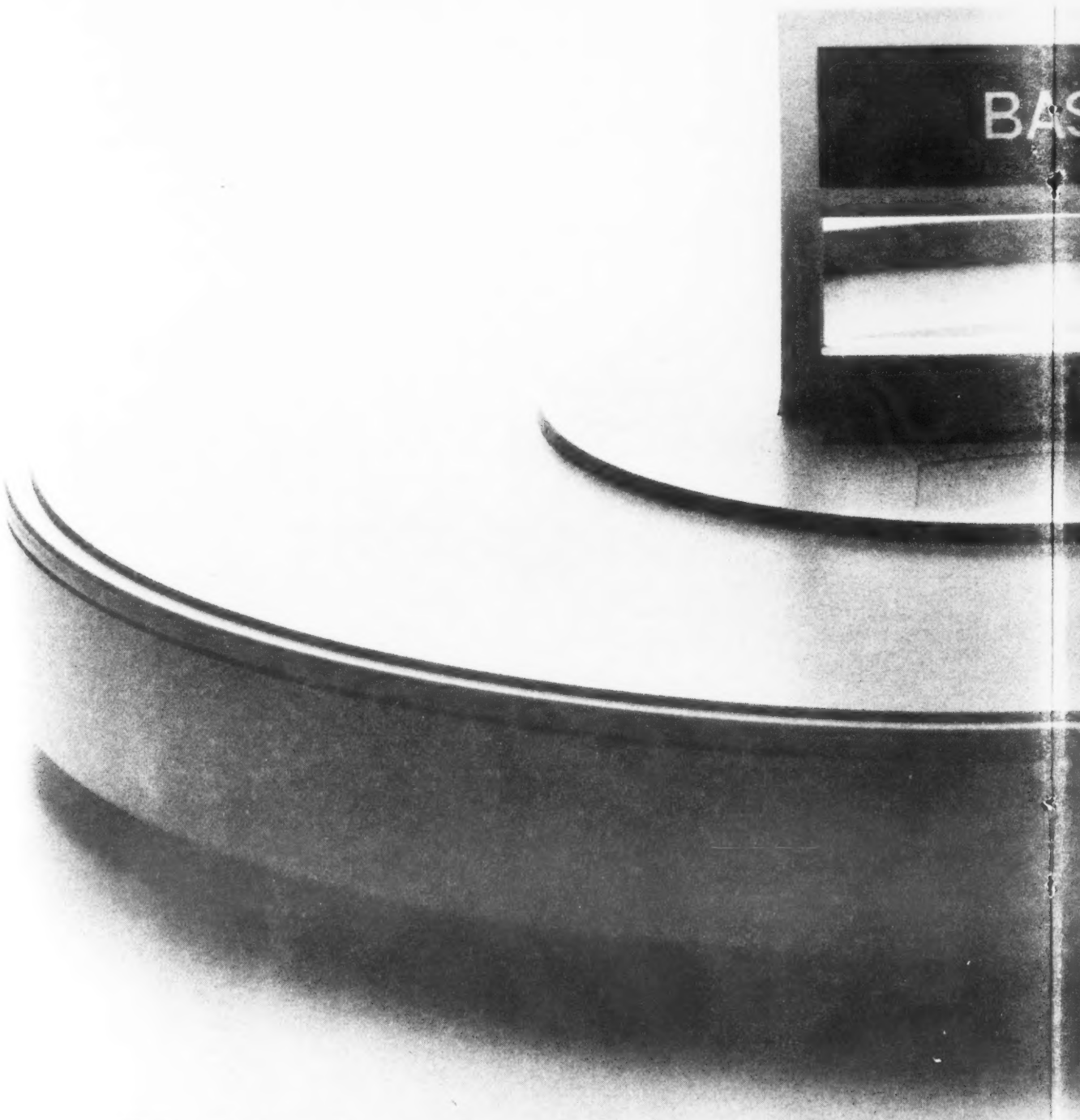

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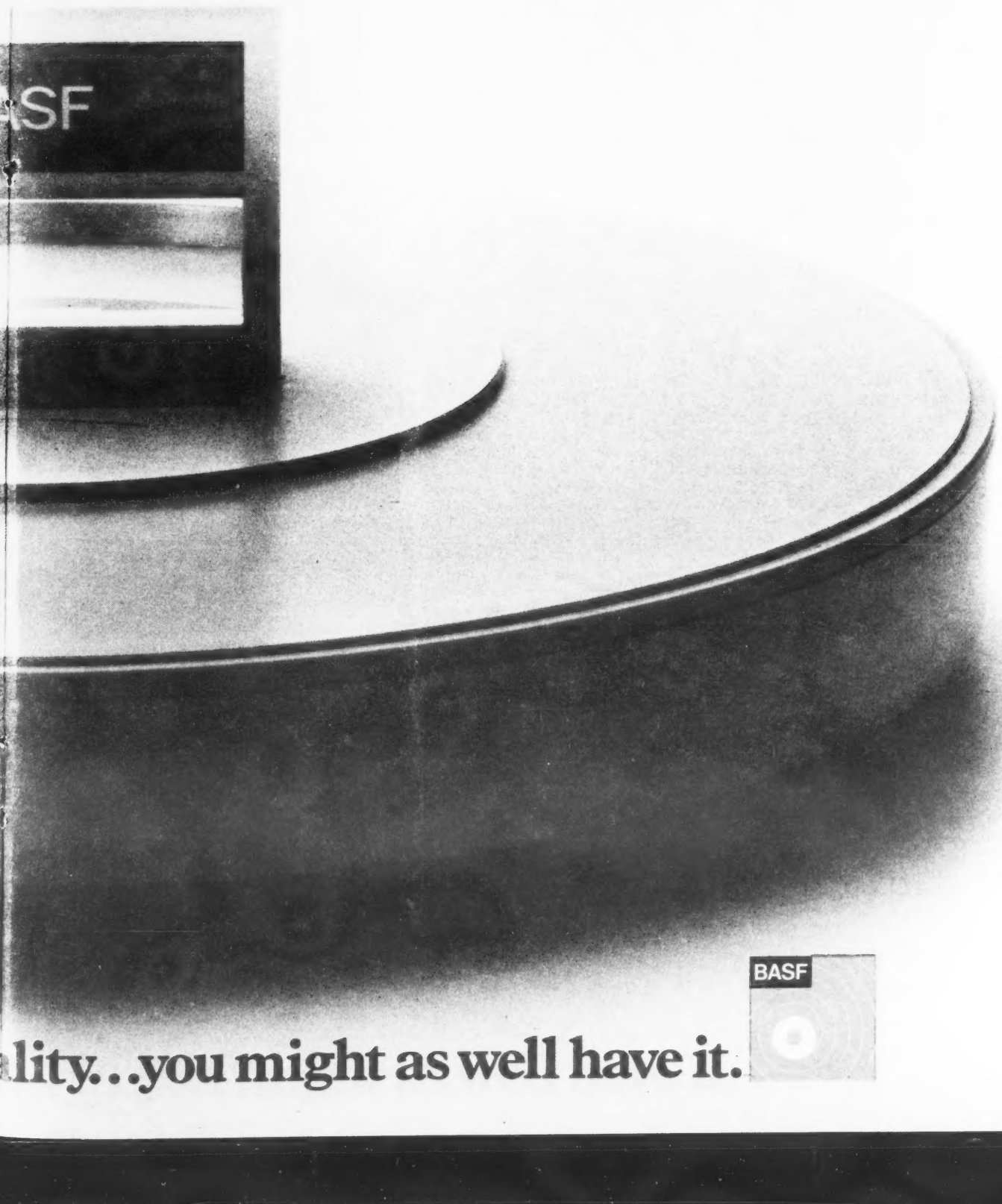

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BASF

NCR Turnkey System Based on CRT Entry

By Vic Farmer
Of the CW Staff

DAYTON, Ohio – NCR has wrapped up bits and pieces of hardware available in its present line and developed an interactive mini-based turnkey system for small businesses.

Called the NCR Sprint (Sales Processing Interactive Real-time Inventory Technique), the system has modified the CPU used in the firm's 725 and 726 retail systems and added a fixed and removable disk, line printer and up to four 796 CRT terminals previously available with the Century 50 and 100s.

But whereas the 50s and 100s are basically batch-oriented machines, the Sprint is geared for interactive use depending on data entry and inquiry through the CRT terminals.

Sprint is organized around five master files: an inventory master file, a customer master file, a vendor master file, a discount matrix file and an order status file.

In addition to an operating system, users will get a package of programs for interactive order entry, invoicing, shipping and inventory control. Other applications such as general ledger and accounts payable written in Neat 3 for Century 50s and 100s will also be available to users for batch processing functions.

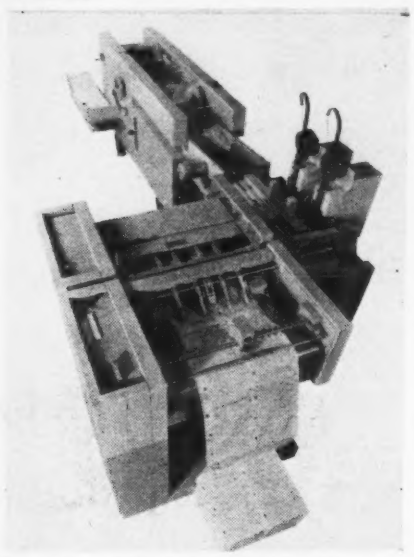
The minicomputer, the Century 8200, is not presently available as a separate unit. Core memory ranges from the basic 32K to a maximum of 64K.

While the CRT terminals can be attached remotely through standard communication data sets, higher-level communications necessary for the system to operate as a satellite are not presently available but are planned for the future, an NCR spokesman said.

A basic 8200-150 with 32K, 9.8M char. disk memory, card reader, 125 line/min printer and one NCR 796 CRT display terminal is priced at $39,750 and will rent for $1,285/mo. Optional line printers of 200- and 300 line/min and an additional disk drive are available.

Users seeking to upgrade to a larger NCR system should be able to convert to a compatible Century 101, NCR said. First deliveries are scheduled for March 1975.

NCR's Sprint system uses the NCR Century 8200 minicomputer with on-line CRT data entry.



The Bowe 114 cuts multiple form printouts, sequences them, and staples them and stuffs them into envelopes.

With 19 Configuration Options

German Maker Offers Forms Handling Devices

By a CW Staff Writer

BURLINGTON, Mass. – Users in this country seldom get an opportunity to examine or procure European equipment, but Bowe forms handling equipment manufactured in Augsburg, West Germany and now available here may have some unusual and noteworthy features for forms users.

Up to 14 Bowe devices can be combined to take computer printout and decollate, part web separate, cut, sequentially arrange, dual sequentially arrange, staple, horizontal fold, vertical fold, stack, insert in envelopes, insert additional printed forms in envelopes, and stamp the envelopes.

These devices can be bolted together into 19 different production line configurations. The smallest system, a $20,000 Model 182, will cut a printout into pages, fold the cut page and insert it into an envelope at a speed of 3,500 envelope/hour. Attachment of a standard postage meter is additional.

At the more complex and expensive end – $110,000 – a user of a Model 112 can start with two piles of printouts. One channel can trim and cut forms to size and fold. The second channel will take a second printout, cut and trim individual pages into a sequenced package and transport them to an assembly unit where they are merged with a related form from the first channel.

The combined package is then fed into the inserting machine where up to three additional inserts may be added before the total package is placed into an envelope.

An optical mark recognition system makes is possible to match one or more forms from channel two with the proper forms from channel one. The envelope can then be stamped and stacked.

Users of the Model 107 can run a printout through the machine and come out with a stapled booklet ranging in size from 2-1/2 in. by 3 in. to 9 in. by 12 in.

With most of these units a bypass device can be used to stack certain pages of cut prinout separately.

Some Bowe products were distributed by IBM in the late 60s. Computerlink Corp. is now the distributor in the U.S. Deliveries are quoted at four to eight months. Computerlink is at 14 Cambridge St., 01803.

User Quells Confusion With Tape Mount Displays

By William Irons
Special to Computerworld

TULSA, Okla. – For an information systems company mounting anywhere from 500 to 1,000 tapes daily, a tape handling system is essential. At Mentor Corp., a system which automatically communicates tape mount change alerts and volume serial number identifications to the tape handler was installed to help streamline the enormous work flow.

Even before the Mentor tape operation was large enough to justify investment in a tape command and display system, it was apparent the need would soon develop.

As tapes and tape drives multiplied, the confusion resulting from misunderstood messages and excess traffic increased proportionately, until the operation began to look like a Chinese fire drill.

Without a tape mount display system, all communication between console operators and tape handlers is oral and contact between them is continuous. The tape handler has to be certain he hears the identifying letters and numbers correctly and remembers them while he locates the reel. If several mount requests are received simultaneously, the identifications have to be called out and assigned serially.

By the end of the day, personnel are hoarse from shouting, and the excess noise levels and accelerated traffic have built up environmental pressure, diminished productivity and compounded the likelihood of error.

To overcome this problem, Mentor mounted VSN displays from Genesis One Computer Corp. on 24 IBM 3420 tape drives connected to two 370/145s.

The system required no operator training, speeded up response to tape mount requests and improved overall control of tape operations.

Besides these advantages, the installation has had other benefits.

Applicants for tape handling jobs used to be required to have an understanding of OS. Now junior tape handlers with less experience can be hired since they become productive more quickly. They can be trained as console operators while they're on the job.

The console operator benefits, too. Since he's relieved of the mechanics of mounting tapes, he can concentrate his attention on all the other jobs he's running through the computer system.

Perhaps the only way anyone can truly appreciate the change is to have been subjected to the previous noise levels – the constant yelling back and forth. The VSN display even relays information to the tape handler as to the disposition of the tape after rewinding and unloading.

William Irons is manager of DP planning and support at Mentor Corp.

Mentor console operator Tom Young checks tape reel number against volume serial identification on lighted VSN display.

Correction

Peripheral Interface Corp. (Pico) is located at 1616 S. Lyon St., Santa Ana, Calif. 92705.

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Risk of Lost Data, High Insurance Rates Cost-Justify Fire Protection Systems

NEW YORK – Fire and related heat, water and smoke can destroy an entire DP installation, according to Louis Scoma Jr., president, Data Processing Security, Inc. Investment in systems to protect a center can be easily justified against the replacement costs for lost data and high insurance rates for poorly protected systems, he told attendees at a recent conference.

Rating fire protection systems from worst to best, Scoma considered water worst. "But if you must use it, be sure it's a dry system where the lines fill with water only when the detection system measures heat at the 110 degree melting point," he said.

Next came carbon dioxide, with the disadvantage that "it's a one shot deal." Once the gas is released, as it might be if a fire were to be detected in a nearby room, there may be no more gas when the flames reach the computer area, he warned.

He rated Halon 1301 best since it is not harmful to either humans or electronic gear.

Regardless of the fire protection system used, be sure to have a rehearsed procedure in the event that an emergency does happen, Scoma urged. "If the supervisor on the third shift has to call the DP manager to find out what to do about the fire in the waste basket in the tape library, it's already too late," he said.

Riots and vandalism should also provoke an automatic, rehearsed response from DP employees, he said. Downtime in such a case even without serious damage can cost a company thousands of dollars.

As for access control, Scoma rated seven basic strategies now in use.

Not surprisingly, a sign on the door reading "authorized personnel only" was rated lowest, with a cipher lock second to that.

Among the somwhat better systems, Scoma mentioned the conventional key and the coded badge. The best is the coded badge system with a printout and rule-out capability. Tops, he said, is the fingerprint reader.

Tailgating – two or more people going through on one ID – is a problem in all systems, Scoma said.

Sabotage by the "disgruntled" employee is the single greatest threat to data security, according to Scoma.

Joint Power Effort Can Prevent Disaster

LOS ANGELES – Close communication between DP manufacturers, users, utilities and makers of uninterruptible power supplies (UPS) can help prevent disaster, according to speakers at the Wescon session on "What To Do If the Lights Go Out – The Uninterruptible Power Story."

John M. Roberts and Haig E. Tasjian of IBM's System Development Division advised motors be applied at a conservative 75% of their design load rating in order to assure normal life and satisfactory performance.

Voltage unbalance and reductions cause temperature rises in motors; a rise of over 10° C is thought to cut motor life in half, they cautioned.

"The computer system is an essential load that is dependent to some extent on the quality of externally supplied power, regardless of what the computer supplier does to intrinsically improve the power reliability of his DP equipment," they said.

DP centers with a separate main feeder and an isolation transformer for the DP system can obtain a "significant reduction in the negative effect that local switching disturbances can have on computer operations."

Roberts and Tasjian reminded users who want to keep centers operating during a power failure that they need a UPS to handle the air conditioning, ventilating and/or coolant pump equipment in addition to DP equipment.

DP manufacturers can provide load profile data to enable customers to quantify their UPS requirements for large system configurations, the IBM speakers said.

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CI Notes

Railroad Picks Incoterm

NATICK, Mass. – Incoterm Corp. has signed a contract with the Missouri Pacific Railroad Co., The Texas and Pacific Railway Co. and the Chicago and Eastern Illinois Railroad Co. for about $4.6 million worth of intelligent terminal systems equipment and services.

The equipment, SPD 20/20s and SPD 10/25s and peripherals, will provide a real-time on-line inquiry/response environment for use in freight car control, waybill preparation, report generation and transmission of freight yard operating information.

DDI to Sell NCR Terminals

GREENWICH, Conn. – Data Dimensions, Inc. (DDI) has contracted with NCR to purchase several different models of the NCR 260 Series terminal family which Data Dimensions will market under its own name.

The DDI 200 Series will be serviced by NCR through its national service organization.

While this agreement marks the first time the company will market a product under its own name, DDI has marketed portable terminals and other DP equipment from various manufacturers.

NCC Touted Abroad

MONTVALE, N.J. – The 1975 National Computer Conference & Exposition, sponsored by the American Federation of Information Processing Societies, Inc. (Afips), has been designated one of 13 conferences/expositions to be promoted abroad by the U.S. Department of Commerce in an effort to attract international visitors and buyers.

As part of this exchange, foreign buyers will supply Afips with information about their product lines, business concerns and prospective needs. Such information will be passed on to interested exhibitors.

The conference will be held in Anaheim, Calif., May 19-22.

Supershorts

Sykes Datatronics has negotiated a $1 million OEM agreement with Orbis Systems, Inc. for the Orbis Model 74, an IBM-compatible diskette drive to be used in the Sykes Series 7000 disk system.

— — —

Leasco Response Terminals, Inc. has changed its name to Leasco Data Communications Corp. to reflect a wider range of products.

— — —

Lear Siegler's Electronic Instrumentation Division has chosen Victor Associates to distribute ADM-1 and ADM-2 terminals in New England.

IBM-Comsat: Antitrust Dilemma

Sherman Act Sound, Justice Lawyer Says

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. – In the face of growing sentiment among antitrust lawyers that the antitrust provisions of the Sherman Act are too vague and outdated to be effective in today's business world, a Justice Department lawyer told the Federal Bar Association recently that the act is "so general in its terms and so wise in its policy" it can be applied to almost any emerging circumstance.

Donald I. Baker, deputy assistant attorney general of the Antitrust Division, said this is true even though the Sherman Act was written in the 1890s, long before anyone ever had heard of a computer.

"Antitrust is an important tool today because it is a constant spur to every businessman to try to produce that legendary 'better mousetrap'."

Antitrust is concerned that "restraints on innovation not be imposed by agreement among competitors," but it will permit certain joint arrangements, where necessary, for the development of new technology or the production of new products, he said.

Joint research, joint patent arrangements, joint development ventures and standards-making and certification are a few of the areas in which antitrust must be examined.

The Justice Department will have to consider that such a venture may be necessary to compete in a business requiring large capital and technical resources, he said.

"Beyond that, it must face a much more fundamental fact question: Is the loss of potential, independent competitors outweighed by the risks of no entry at all?"

Baker also noted that the government has never brought an antitrust suit involving purely joint research arrangements. Each jointure case has also involved patent pooling.

"Patent pools or interchanges have been held plainly illegal where they limit existing competition by fixing prices or allocating territories," he stated.

The fear here, he said, is that the pooling arrangement may destroy the incentives for private firms to engage in technical research and development, thus operating as an insurance arrangement against being "out-innovated by others."

It is particularly hard to analyze joint ventures involving new or evolving technology since it inevitably changes the traditional market or creates a new one, Baker remarked.

He cited the Comsat-IBM domestic satellite proposal now pending before the Federal Communications Commission as an example.

This, he said, would establish a joint venture between the nation's leading computer maker and its only experienced satellite carrier.

Such a venture would compete against an AT&T-Comsat joint venture and a Western Union satellite system and also would compete with terrestrial networks, largely dominated by AT&T.

But, while engendering a new competitive force, the Comsat-IBM venture does so "at the price of creating an indirect interlock arrangement with the AT&T-Comsat venture, perhaps increasing at least psychological barriers to entry and eliminating any likelihood of IBM or Comsat entering separately or with other partners," Baker said.

IBM, California Squaring Off In Legal Battle Over Teale

By Nancy French
Of the CW Staff

SACRAMENTO, Calif. – IBM and the State of California are facing off for possible litigation – and probably an out-of-court settlement – over the state's failure to place the Department of Motor Vehicles (DMV) and the Department of Water Resources under the jurisdiction of the Stephen P. Teale Data Center as originally planned.

Both sides are claiming breach of contract: IBM over the state's failure to appropriate the $20 million contracted for a comprehensive multidepartment computer system, and the state for IBM's failure to deliver hardware and develop software "that works" for the DMV and Water Resources by the July 1 deadline.

Both sides' claims are in the millions.

To date, the state has appropriated only $4.6 million for the $20 million IBM contract.

In addition, an IBM source noted, the company has claims against the state of more than $8 million in billable time for systems and hardware, but a clause in the contract obligates the state only for the amount appropriated to date – $4.6 million.

From the state's point of view, IBM missed the July 1 deadline for completing the conversion of DMV data, thus delaying by one year implementation of staggered registration.

The registration plan, expected to generate about $50 million a year in local revenue, would have earned $4 million to $5 million in interest for the state.

The delay also resulted in unanticipated expenditures for the rental of Univac equipment retained by the DMV.

The state is negotiating a new contract with IBM to obtain additional equipment for the Teale Center. "Obviously we're going to do business with IBM, and it is unlikely that this matter will reach litigation. A lawsuit would be both costly and embarrassing," a state source said.

The legislature's decision to stick to the budget established in July, separating the DMV from the Teal Center, leaves the DMV in the position of finding a "temporary solution," according to the source, who said "DMV is talking to Univac about upgrading its present system to handle the staggered motor vehicle registration system for possibly two to three years."

Insurance Market Seen Growing

NEW YORK – DP equipment shipments to insurance markets, together with revenues from related services, are showing a $600 million annual growth rate and should exceed $1 billion by 1978, according to a study by Frost & Sullivan.

As a result of the size and growth of this market, several suppliers have taken an applications-oriented approach to marketing insurance-related DP products and services, the report from the market research firm said.

Sales of systems and peripherals were valued at $355 million in 1973, the report said, and are expected to climb to $597 million in 1978 and $920 million in 1983.

Data-entry and word-processing equipment shipments reached $62 million last year and, according to study predictions, will reach $126 million by 1978 and $188 million by 1983.

Valued at $145 million in 1973, the market for software and services will amount to $213 million in 1978, $329 million in 1983.

Frost & Sullivan found the most widespread applications of computers in the insurance industry were for policy data bases, applications processing and corporate accounting.

The greatest increases in computerization, according to the study, are expected to be for on-line home office access and on-line agent proposals.

The survey indicated a wide variation in average DP expenditures per million dollars in total assets, varying between $600 and $12,000 per million. The average, however, is some $4,000 for larger firms and $3,000 for the smaller insurers.

Over the next 10 years, half the firms surveyed expect 20% annual increases.

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Points to Backlog

NCR Refutes Reports of POS Hesitancy

MELBOURNE, Australia – Despite indications from several major retailers here that full-scale point-of-sale (POS) systems for their stores are "premature," NCR claimed it is hard-pressed to keep up with POS orders to date.

The firm has netted more than $5 million in sales of its 280 POS systems throughout Australia and Southeast Asia in recent months, according to David Laws, NCR Australia marketing director and manager for that region.

Of more than 1,200 NCR 280 systems sold in the area, more than 900 have been purchased by Australians, he said.

Had to Expand

To meet current Australian as well as world retailer demands and to catch up on backlog orders for the 280 systems, Laws contended NCR has had to expand its manufacturing facilities in the U.S. and begin 280 production at its Scotland plant.

But while NCR may have to extend itself to fulfill current POS orders, one of Australia's largest retailers recently commented that major stores will not adopt POS systems wholeheartedly until the systems have been perfected and terminals are less expensive.

The store asserted it has made an extensive study of overseas POS operations and concluded many overseas retailers "have had their fingers burned" on POS.

Start Small

While convinced that computer systems will eventually dominate retailing, the store indicated it will "experiment small before investing big" in POS until NCR, Singer and IBM systems for data input have evolved further and a universal product code has been established.

To counter negative remarks,

International News

NCR Australia has emphasized its latest POS success with New Zealand's largest department store chain, Farmers Trading Co. Ltd.

Composed of 88 NCR 280 terminals interfaced to a centrally located Century 151 computer through four data concentrators and a minicomputer, the installation represents NCR's first retailer commitment in New Zealand to a full-scale POS on-line system using light pen facilities, an NCR spokesman said.

He added other major regional successes for NCR in recent months have included contracts to supply large configurations involving more than 160 terminals to two Singapore retailers, C.K. Tang Pty. Ltd. and Metro Golden Mile.

N.Z. Picks Univac For Civil Service Pact

SYDNEY, Australia – The New Zealand State Civil Services Commission (SCC) has been authorized to negotiate with Univac on a sole contractor basis for Univac 1100 series equipment with a value estimated at $18.5 million, according to *Computer Weekly*.

Although the SCC reportedly had asked Univac, IBM and Burroughs to resubmit bids with software on a subcontractor basis, it decided to negotiate solely with Univac.

Foreign Orders & Installations

Sparekassernes Data Centraler, Denmark, has ordered a C-System from Collins Radio Group to control its nationwide communications network.

Marine and Trade Insurance Co. Ltd., Johannesburg, South Africa, has ordered a Univac 90/60 system for on-line inquiries, record updates and statistical calculations using the Information Management System/90 special application package.

Alusuisse, Zurich, has ordered a Burroughs B3700 for on-line order entry and head office administrative jobs.

Damart Co., Roubaix, France, makers of thermal underwear, has ordered NCR280 point-of-sale terminals and wands.

Minerva Insurance Group, Milan, Italy, is replacing an IBM 360/20 with a Honeywell 62/60 to handle the data processing of the three companies in the group.

The Oita Bank Ltd. in Oita City, Japan has ordered a Univac 1106 computer system valued at $2.4 million for an on-line system being developed to cover all phases of the bank's operations.

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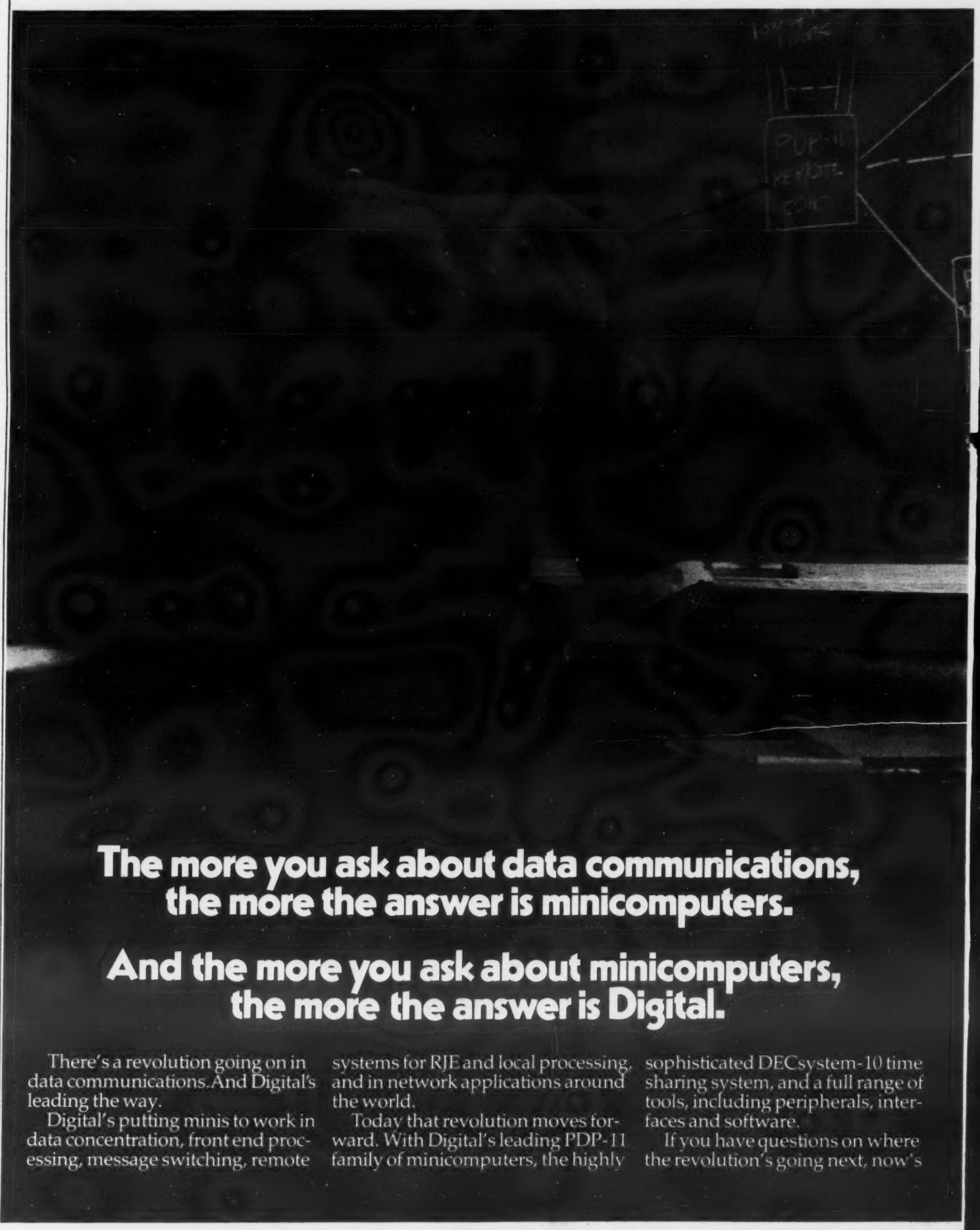


Executives' Directory Compiled

PHOENIX – The August 1974 "Directory of Top Computer Executives" is now available from the publisher, Applied Computer Research (ACR).

The list is based primarily on *Fortune Magazine*'s "Double 500" largest U.S. industrial corporations, plus the six groups of "fifties," according to ACR.

Companies not listed by *Fortune* are included if gross annual revenues exceed $50 million and the total DP budget exceeds $250,000 annually.

For purposes of the directory, the top computer executive is the individual who has general management responsibility for the DP function and devotes full time to DP activities.

Types of companies listed include: manufacturing and service, commercial banks, diversified financial, insurance, retail chains, transportation, utilities and educational institutions.

Single copy price is $50; annual subscription (two semi-annual issues), $80.

ACR is located at 8808 N. Central Ave., Suite 298, 85020.

'Avoid Process Overkill'

User-Vendor Interplay Key to Circuits

LOS ANGELES – One of the key elements in developing a custom MOS/LSI circuit is correctly determing when primary responsibility should shift from the user to the MOS vendor, Joseph A. Mingione of American Microsystems, Inc. told attendees at a recent conference.

"Determining where the most capability lies, assuming it is somewhere between the user and the vendor, can be very difficult and time-consuming," he said.

Custom MOS/LSIs are circuits designed specifically to perform a unique function for an individual user. They are not specifically programmed CPUs or read-only memories (ROMs), he said.

Selection of a wafer fabrication process should be made on the basis of the lowest cost/function and most mature process that satisfies specification requirements.

"Be careful to avoid process overkill of specifications" and new processes, he advised.

"A change in the process as it matures can render your masks obsolete," he said.

Specifications should be detailed, resembling a standard product data sheet, remarked Mingione, AMI's marketing manager for custom MOS/LSI.

A simple purchase order is inadequate, he warned. "A comprehensive contract including production prices and schedules, penalty clauses, tooling rights, patent indemnity, ad infinitum is a necessity," he stressed.

Allow time for development. "Getting to the firm MOS logic and specs can vary from six months to a year," he said. From that point to production shipment can take anywhere from eight months to a year, he said.

A customer should insist that the vendor assign a program manager who will provide monthly progress reports, he added.

Filter Division Sold by Omnitec

PHOENIX – Omnitec Corp. has sold its Filter Division to the O.P.T. Corp. of Phillipsburg, N.J. The sale includes all of the Filter Division's designs and backlog.

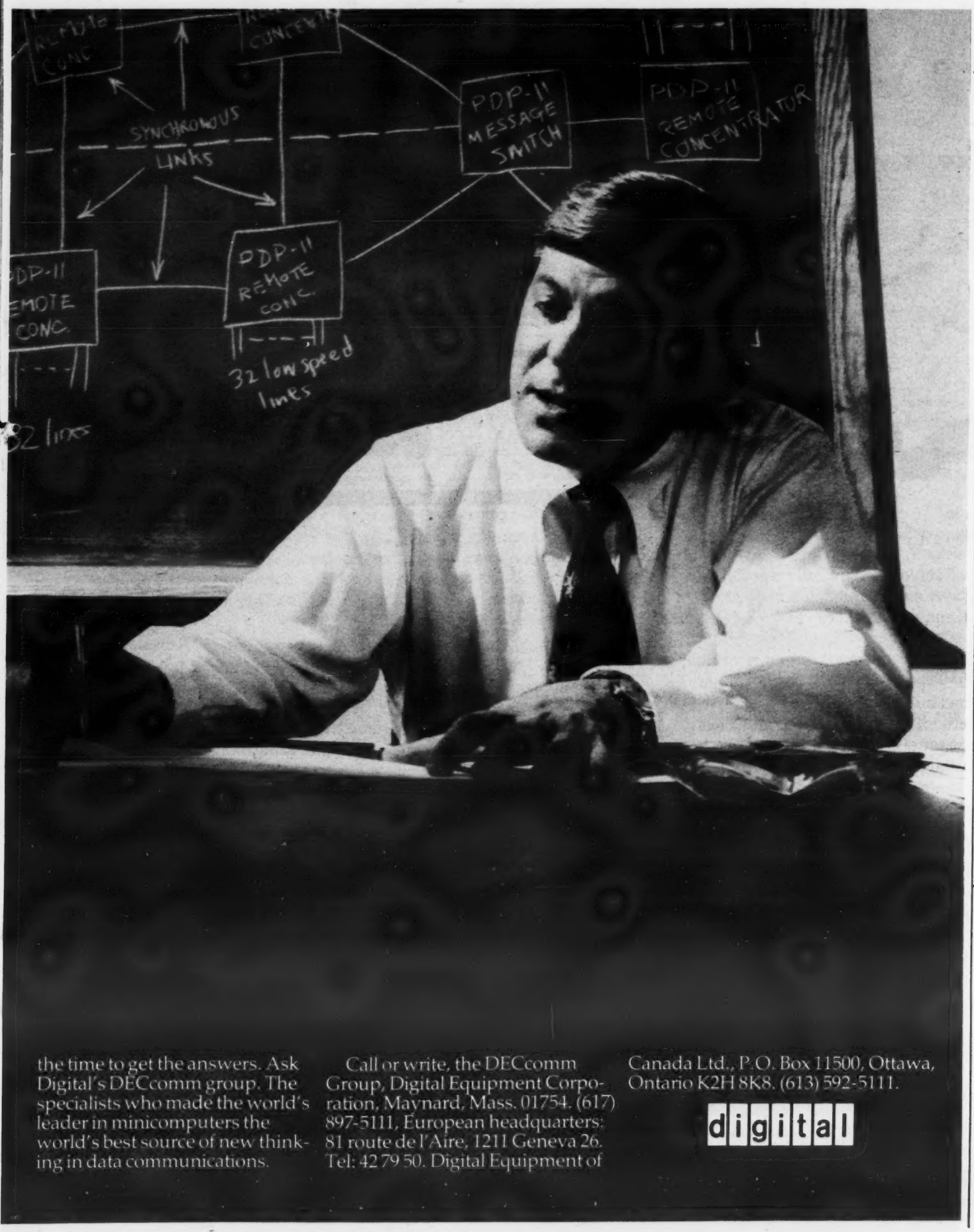
The division made communications filters chiefly for the military market, the firm stated. Omnitec has been deemphasizing its military operation, and the move will allow the company to concentrate on its acoustic coupler and modem products, the firm said.

Omnitec said it recently introduced three new products of this kind and has added 14 distributors and 12 new representatives nationally.

The firm is forecasting $2 million in sales during the fiscal year that began Aug. 1.

BR Division Expanding

ROLLING MEADOWS, Ill. – Bunker Ramo Corp. plans to double the manufacturing capability of its Electronic Store Information Systems (Esis) Division here and to strengthen the division's engineering, planning and development activities by transferring them to the company's commercial research and development center in Trumbull, Conn.



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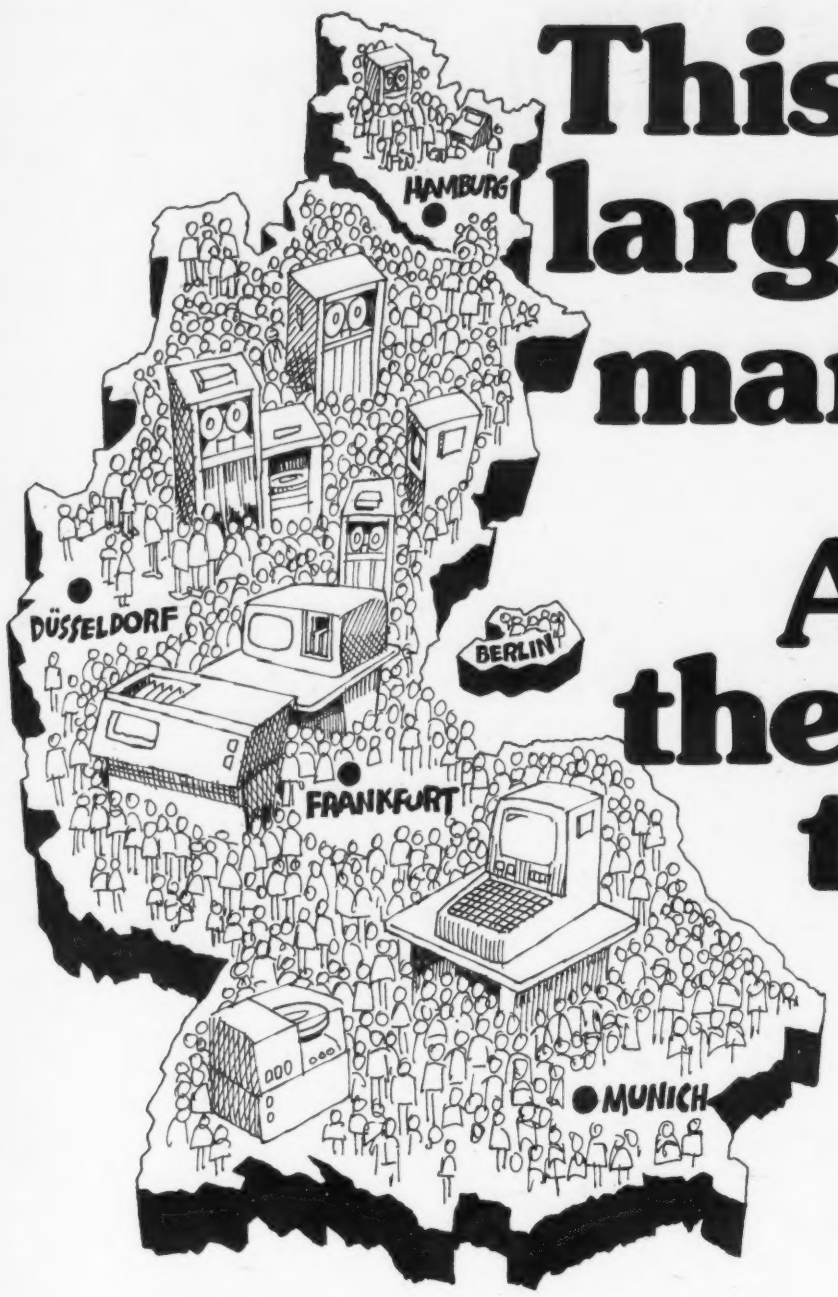

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It's called *Computerwoche,* (woche is pronounced vō-kuh), and it's *Computerworld's* new sister in Germany. Modeled after its parent, *Computerwoche* will serve key computer users in Europe's largest EDP market. It will have an initial circulation of 22,000 including company officers, managers and top technical people at user sites throughout the German market, as well as officers and planners at computer equipment producing companies. Publication begins in October 1974 and will be weekly starting in January.

Computerwoche is published by Computerworld GmbH, with a full editorial and production staff based in Munich, and it will serve the German market with the same editorial excellence that has made *Computerworld* a leading EDP publication in the United States. A recent readership study by IDC Deutschland has shown that German users give highest readership priority to information on new products and services and new techniques for the application of computers. And *Computerwoche* will focus on serving those needs.

The market which *Computerwoche* serves is large and growing. At the end of 1973, there were 11,000 computer systems in Germany, valued at just over $4 billion, and recent market studies indicate that expenditures will be growing rapidly over the next four years. Overall user spending is expected to grow at 14% a year, and areas like terminals and communications equipment and software and services are expected to average growth rates of 25%–30% a year.

TO: Neal Wilder
Vice President, Marketing
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COMPUTERWORLD

Datatron Offers Semi Testing Service

SANTA ANA, Calif. – Datatron, Inc. is offering turnkey installation of prescreening and testing facilities for semi-conductor devices.

DP firms whose needs for testing are relatively small can use Datatron's Microelectric Testing Laboratories (MTL). As volume grows, these firms can obtain in-house testing without a large initial capital outlay through Datatron's lease plan, the company said.

President Clyde J. Davis Jr. said the plan enables users to transfer the same testing procedures used at MTL to in-house facilities.

Each installation will include test programs, training, equipment installation and all environmental equipment the customer needs for testing, a spokesman said.

With the aid of a computer, Datatron analyzes the customer's usage of semi parts and recommends either contract testing services, an in-house test center or a combination of the two.

The expense of defective semiconductor devices can have a severe effect on a company's margin, Davis said.

The industry-accepted standard of faulty devices is about 2% of a shipment. The cost of rework and retest can run as high as 50% of total test cost.

If a company uses 10,000 devices a month, or about 200 boards, statistically the costs of reworking boards will be somewhere between $10,000 and $20,000 each month, Datatron calculated.

Kennedy Opts Into OEM Market

ALTADENA, Calif. – The high cost of money and of maintaining a service organization on a national basis were the primary reasons motivating the Kennedy Co. to get out of the end-user business.

"Since we were carrying our own leases, and considering the high cost of money, we decided to take that same investment and effort that we were putting in the end-user area and concentrate on the more fruitful OEM business," David Krueger, assistant to the vice-president, said, adding that "we're being very successful" at it right now.

Kennedy, which is mainly directing its efforts at the markets dealing with synchronous magnetic tape units, is negotiating to take over other companies' existing installed bases and possibly do a national marketing job, Krueger said.

The firm still continues end-user activities in the greater Los Angeles area, he said, but has no plans to expand. "It would just be too expensive because of the quantity orders it would involve and the high cost of money," he said.

Kennedy is, however, expanding the OEM line to the point that it has had to acquire another 30,000-sq-ft facility in Pasadena to meet production demands, Krueger said.

Contracts

Westinghouse Gets Contract For Montreal Metro System

PITTSBURGH, Pa. – Westinghouse Electric Corp. has been awarded an $18.6 million contract to supply a centralized control system to the Montreal Metro subway system.

The equipment will control train traffic, electric power distribution and auxiliary services throughout the entire system from one location and supervise train scheduling and routing.

The Montreal system will include eight Westinghouse computers and 92 multiplexed communications systems.

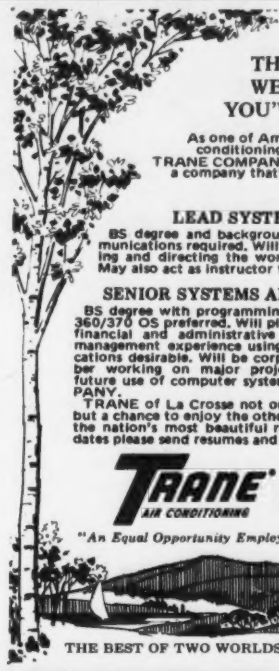
Other Contracts

Creative Socio-Medics has received a contract of $400,000 from the National Institute on Drug Abuse for a nationwide research project to ascertain the extent and nature of polydrug abuse.

The Federal Aviation Administration has awarded a $98,648 contract to Univac to develop a "minimum safe altitude warning" capability for automated radar terminals systems that will enable controllers to alert pilots to potentially dangerous deviations in altitude.

Information International, Inc. has been awarded a contract to create software for the Teale Center's automated typesetting system.

Position Announcements



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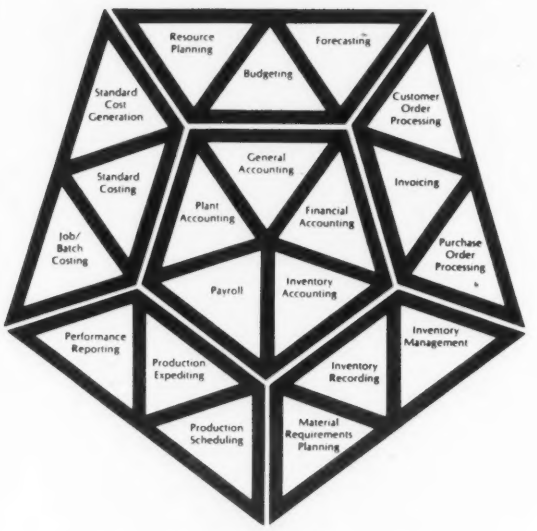

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MARTIN MARIETTA

Posts $3.35 Million Quarter Loss

MDS Confronts Demands From Creditors

UTICA, N.Y. – Mohawk Data Sciences (MDS) said last week it "could not meet its obligations" if the demands of major creditors for immediate or "accelerated" repayment of borrowings are held legitimate.

Reporting a $3.35 million loss for the three months ended July 31 on revenues of $40.3 million, MDS president V.E. Johnson said the holder of its $10 million senior subordinated note continues his charge that MDS has defaulted the terms of the note and is demanding repayment.

The creditor has also "alleged grounds for rescinding the original transaction," according to the company. "If either of the holder's positions is correct, the note would be immediately payable."

The company is also the subject of a dispute among its bank creditors. Some of these are claiming the right to rescind the MDS 1974 Credit Agreement, under which MDS is still borrowing, MDS said.

MDS denied "and would contest" any assertion that such rights had in fact arisen, Johnson said.

Consolidate Strengths

Meanwhile, the company is carrying on efforts to consolidate its strengths. The Data Transcription, Sintered Metal and Micro-Well operations were phased out during the quarter, according to Johnson, and the company has decided to relocate it manufacturing software and programming operations from St. Paul, Minn., to the main manufacturing facility in Herkimer, N.Y.

A relocation expense of $1.2 million was charged against results for the quarter.

On the brighter side, Johnson noted that business volume and operating margins improved during the period. He blamed high interest rates and foreign taxes as well as the relocation expense for the three-month loss.

He also said the company has cut its plans to add more hardware to its rental base for the rest of the year, a move designed to lessen the company's need for bank capital.

Mohawk's outstanding borrowings currently amount to $102 million under the 1974 Credit Agreement. It's bank creditors have the right to accelerate payment of these borrowings if they wish, MDS said.

Acceleration of these repayment schedules would also accelerate the company's $45 million worth of convertible debentures.

Johnson said discussions with the holder of the senior note are continuing but have been "unsuccessful to date."

"If such outstanding debts were to become due and payable, the company could not meet such obligations," he concluded.

REI's Trace Installation Stalled

DALLAS – Recognition Equipment, Inc.'s (REI) installation of its first Trace system at First National City Bank in New York is still behind schedule and is not expected to be completed by the end of its fiscal year, Oct. 31. In addition, interim payments of $1.6 million will not be reflected in revenues until all transports are accepted, the company said.

REI has arranged to borrow over $2 million from foreign sources for working capital and to provide most of the cash for payment of about $2.3 million due this month as part of the restructuring of its 7-1/2% convertible subordinated notes.

The debt will be discharged by payments from foreign customers through October upon delivery and acceptance of certain equipment.

REI said it does not anticipate any need for additional borrowing for the rest of the calendar year, assuming timely receipt of the $4.9 million balance of the Trace contract.

Calcomp Breaks Year-End Records

ANAHEIM, Calif. – California Computer Products (Calcomp) reported record sales and earnings for the fiscal year ended June 30. Revenues rose 62% to $130 million over the $80.3 million reported last year, according to Lester L. Kilpatrick, president and chairman of the board.

The company reported net income of $8.67 million or $2.84 a share, up from $465,000 or 16 cents a share last year.

Kilpatrick noted that earnings were boosted this year by an extraordinary tax credit amounting to $3.3 million.

Calcomp, a supplier of disk drives, tape drives and graphic plotter systems, recently began marketing an automated tape library and terminal equipment.

ADR 6 Months Improve

PRINCETON, N.J. – Applied Data Research, Inc. (ADR) reported operating revenues of $5.9 million for the six months ended June 20, an ADR record.

Earnings for the period were $169,667 or 14 cents a share, according to John Bennett, president. For the same period in 1973, revenues were $5 million and earnings were $136,527 or 12 cents a share.

Scan-Data Turns In Healthier Half

NORRISTOWN, Pa. – Despite a slight slump in Scan-Data Corp.'s second-quarter earnings, six-month earnings showed a sharp improvement over last year.

For the six months, earnings jumped to $43,196 or 3 cents a share from $15,386 or 1 cent a share in the year-ago period.

Revenues for the half year also rose, to $4.4 million from $3.3 million last year, the company said.

The 1974 figure includes a $14,234 tax credit, whereas the 1973 period had a $3,385 credit.

Lease revenues were down in both the six months and quarter compared with year-ago figures; however, these were overshadowed by increases in sales.

Earnings during the quarter slid to $12,560 or 1 cent a share from $13,537 or 1 cent a share in the year-ago period, while revenues rose to $2.5 million from $1.7 million.

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Earnings Reports

ELECTRONIC ENGINEERING OF CALIFORNIA
Three Months Ended June 30

	1974	1973
Shr Ernd	$.48	$.32
Revenue	5,033,000	3,092,000
Disc Op	.....	(59,000)
Earnings	295,000	199,000
6 Mo Shr	.95	.44
Revenue	9,367,000	6,113,000
Disc Op	.....	(208,000)
Earnings	581,000	274,000

FOXBORO
Three Months Ended June 30

	1974	1973
Shr Ernd	$.52	$.59
Revenue	51,300,000	44,605,000
Earnings	2,370,000	2,703,000
a6 Mo Shr	.80	.75
Revenue	94,509,000	79,716,000
Earnings	3,663,000	3,435,000

a-Excludes gains from currency fluctuations.

GRAHAM MAGNETICS
Year Ended June 30

	a1974	1973
Shr Ernd	$1.40	$1.06
Revenues	15,000,000	11,387,087
Earnings	1,320,000	986,129

a-Preliminary.

ELECTRONIC ASSISTANCE
Three Months Ended July 31

	1974	1973
Shr Ernd	$.13	$.01
Revenue	11,617,000	a9,347,000
Disc Op	.....	18,000
Tax Cred	94,000	.....
Earnings	254,000	20,000
6 Mo Shr	.20	.....
Revenue	21,997,000	a17,879,000
Tax Cred	123,000	.....
Earnings	384,000	(117,000)

a-From continuing operations.

DIGITAL EQUIPMENT
Year Ended June 30

	1974	1973
Shr Ernd	$3.80	$2.16
Revenue	421,884,000	265,469,000
Earnings	44,400,000	23,500,000
3 Mo Shr	1.36	.85
Revenue	135,199,000	86,301,000
Earnings	15,981,000	9,321,000

ELECTRONIC ASSOCIATES
Three Months Ended June 28

	1974	1973
Shr Ernd	$.03	$.12
Revenue	11,705,000	13,122,000
Tax Cred	.....	52,000
Earnings	74,000	326,000
6 Mo Shr	.....	.38
Revenue	20,645,000	21,997,000
Tax Cred	.....	361,000
Earnings	(186,000)	1,023,000

RECOGNITION EQUIPMENT
Three Months Ended July 31

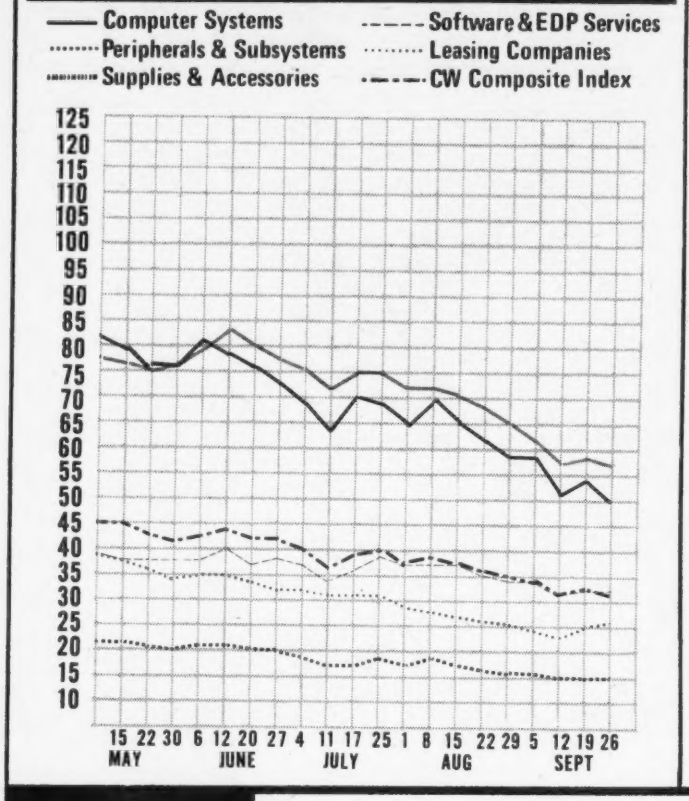
	1974	1973
Shr Ernd	$.40	$.35
Revenue	9,543,000	10,275,000
Tax Cred	252,000	776,000
Earnings	2,084,000	1,793,000
9 Mo Shr	.26	.24
Revenue	28,623,000	28,308,000
Tax Cred	949,000	1,036,000
Earnings	1,363,000	1,229,000

REYNOLDS AND REYNOLDS
Three Months Ended June 30

	1974	a1973
Shr Ernd	$.23	$.32
Revenue	18,444,772	16,302,728
9 Mo Shr	.84	.90
Revenue	53,841,909	47,731,346
Earnings	3,955,913	4,202,222

a-Restated for an acquisition on a pooling-of-interests basis.

COMPUTERWORLD Computer Stocks Trading Indexes



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Computerworld Stock Trading Summary

TRADE*QUOTES

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

EXCH		1974 RANGE (1)	CLOSE SEP 26 1974	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	71-217	70 7/8	-6 1/4	-8.1
O	COMPUTER AUTOMATION	5- 14	4 1/2	-3 3/4	-45.4
N	CONTROL DATA CORP	13- 38	15 3/4	- 1/4	-1.5
N	DATA GENERAL CORP	16- 38	16 3/8	-1 7/8	-10.2
O	DATAPOINT CORP	8- 15	8	- 1/2	-5.8
O	DIGITAL COMP CONTROL	2- 5	2 1/4	+ 1/8	+5.8
N	DIGITAL EQUIPMENT	66-121	66 1/8	-9 3/8	-12.4
N	ELECTRONIC ASSOC.	2- 3	2	+ 3/8	+23.0
A	ELECTRONIC ENGINEER.	5- 11	5 3/4	0	0.0
N	FOXBORO	21- 48	21 3/4	- 1/4	-1.1
O	GENERAL AUTOMATION	18- 40	17 3/4	-3 1/2	-16.4
O	GRI COMPUTER CORP	1- 2	1/2	0	0.0
N	HEWLETT-PACKARD CO	62- 90	62 1/8	-3 1/2	-5.3
N	HONEYWELL INC	28- 86	29 5/8	-2 1/4	-7.0
N	IBM	152-251	164	-6 1/2	-3.8
O	INTERDATA INC	8- 22	13 1/2	- 3/4	-5.2
O	MICRODATA CORP	2- 5	2	- 1/2	-20.0
N	NCR	19- 40	20	-2 1/4	-10.1
N	RAYTHEON CO	22- 39	23	+ 1/2	+2.2
N	SINGER CO	14- 40	13 7/8	-1 3/8	-9.0
N	SPERRY RAND	24- 44	26 3/4	- 5/8	-2.2
A	SYSTEMS ENG. LABS	1- 3	1 1/4	- 1/4	-16.6
N	TEXAS INSTRUMENTS	61-115	60 3/4	-6 1/4	-9.3
O	ULTIMACC SYSTEMS INC	1- 2	7/8	- 1/8	-12.5
N	VARIAN ASSOCIATES	6- 13	6 5/8	- 1/8	-1.8
N	WANG LABS.	7- 20	8 3/4	- 1/8	-1.4
N	XEROX CORP	67-127	66 1/2	-12 1/4	-15.5
	LEASING COMPANIES				
O	BRESNAHAN COMP.	2- 2	2 1/8	0	0.0
O	COMDISCO INC	1- 7	1 1/2	+ 1/2	+50.0
A	COMMERCE GROUP CORP	3- 6	2 7/8	0	0.0
O	COMPUTER EXCHANGE	1- 1	1/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 4	3/4	0	0.0
O	COMP. INSTALLATIONS	1- 1	1/4	0	0.0
M	DATRONIC RENTAL	1- 1	7/8	0	0.0
A	DCL INC	0- 1	3/8	0	0.0
N	DPF INC	2- 5	2 1/2	0	0.0
O	EDP RESOURCES	2- 3	3 1/4	0	0.0
A	GRANITE MGT	1- 3	1	0	0.0
A	GREYHOUND COMPUTER	2- 6	2 1/4	- 1/2	-18.1
A	ITEL	3- 6	3	0	0.0
N	LEASCO CORP	5- 12	8 1/4	+ 1/8	+1.5
O	LEASPAC CORP	1- 2	5/8	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NRG INC	1- 5	1 5/8	-1	-38.0
A	PIONEER TEX CORP	2- 10	2 1/2	+ 1/8	+5.2
A	ROCKWOOD COMPUTER	1- 1	5/8	*	+10.0
N	U.S. LEASING	5- 24	7 1/4	+ 3/8	+5.4

EXCH		1974 RANGE (1)	CLOSE SEP 26 1974	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1	0	0.0
A	APPLIED DATA RES.	2- 3	1 1/2	0	0.0
O	APPLIED LOGIC	1- 1	1/8	0	0.0
N	AUTOMATIC DATA PROC	21- 57	24 3/4	+ 1/4	+1.0
O	BRANDON APPLIED SYST	1- 1	1/4	0	0.0
O	CENTRAL DATA SYSTEMS	4- 6	3	0	0.0
O	COMPUTER DIMENSIONS	2- 3	1 1/2	0	0.0
O	COMPUTER HORIZONS	1- 5	1	- 1/4	-20.0
O	COMPUTER NETWORK	1- 2	1 1/8	0	0.0
N	COMPUTER SCIENCES	2- 4	2 1/4	+ 1/8	+5.8
O	COMPUTER TASK GROUP	1- 1	3/4	0	0.0
O	COMPUTER TECHNOLOGY	1- 1	1/2	0	0.0
O	COMPUTER USAGE	2- 4	2 5/8	+ 3/8	+16.6
O	COMRESS	1- 1	1/4	0	0.0
O	COMSHARE	2- 4	1 3/4	- 1/8	-6.6
N	CORDURA CORP	2- 4	1 5/8	+ 1/8	+8.3
O	DATATAB	1- 3	1 1/8	+ 1/8	+12.5
A	ELECT COMP PROG	1- 1	1/8	0	0.0
N	ELECTRONIC DATA SYS.	12- 25	12 5/8	-1 7/8	-12.9
O	INFONATIONAL INC	1- 2	1/2	0	0.0
O	I.O.A. DATA CORP	1- 1	1/4	0	0.0
O	IPS COMPUTER MARKET.	1- 1	3/4	0	0.0
O	KEANE ASSOCIATES	2- 4	1 3/4	0	0.0
O	KEYDATA CORP	1- 6	1 1/2	0	0.0
O	LOGICON	2- 5	2 3/8	- 1/8	-5.0
A	MANAGEMENT DATA	1- 2	1	- 1/4	-20.0
O	NATIONAL CSS INC	10- 37	11 1/2	- 1/2	-4.1
O	NATIONAL COMPUTER CO	1- 1	1/4	0	0.0
A	ON LINE SYSTEMS INC	18- 30	20	+1 3/4	+9.5
N	PLANNING RESEARCH	2- 3	2 1/8	- 1/8	-5.5
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	1- 5	1 1/4	0	0.0
O	SCIENTIFIC COMPUTERS	1- 1	5/8	0	0.0
O	SIMPLICITY COMPUTER	1- 1	3/4	0	0.0
O	TCC INC	1- 1	1/4	0	0.0
O	TYMSHARE INC	6- 12	6 7/8	- 1/8	-1.7
O	UNITED DATA CENTER	2- 4	2	0	0.0
A	URS SYSTEMS	2- 4	1 7/8	0	0.0
N	WYLY CORP	2- 5	2 3/8	+ 1/4	+11.7
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	4- 11	4 1/2	+ 1/4	+5.8
O	ADVANCED MEMORY SYS	1- 7	1 3/8	+ 1/8	+10.0
N	AMPEX CORP	3- 5	3 1/8	0	0.0
O	ANDERSON JACOBSON	2- 4	2 1/4	0	0.0
O	BEEHIVE MEDICAL ELEC	2- 7	2 3/4	0	0.0
A	BOLT,BERANEK & NEW	5- 9	5 3/8	+ 1/2	+10.2
N	BUNKER-RAMO	4- 8	4 3/4	+ 1/4	+5.5
A	CALCOMP	5- 11	5 3/4	- 1/2	-8.0
O	CAMBRIDGE MEMORIES	4- 16	5 1/8	0	0.0
O	CENTRONICS DATA COMP	8- 23	7 3/4	-1 3/4	-18.4
O	CODEX CORP	8- 15	10 1/4	- 1/4	-2.3
O	COGNITRONICS	1- 2	1/2	+ 1/8	+33.3

EXCH		1974 RANGE (1)	CLOSE SEP 26 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMPUTER COMMUN.	1- 2	3/8	- 1/8	-25.0
A	COMPUTER EQUIPMENT	1- 2	1 1/4	0	0.0
O	COMPUTER MACHINERY	2- 5	2 3/8	+ 1/4	+11.7
O	COMPUTER TRANSCEIVER	1- 2	3/4	0	0.0
N	CONRAC CORP	10- 22	11 1/4	0	0.0
O	DATA ACCESS SYSTEMS	2- 3	2 1/2	0	0.0
O	DATA 100	6- 13	6 3/8	+ 1/8	+2.0
A	DATA PRODUCTS CORP	3- 4	2 7/8	0	0.0
O	DATA RECOGNITION	1- 1	1/4	0	0.0
O	DATA TECHNOLOGY	2- 4	2 3/8	0	0.0
O	DECISION DATA COMPUT	3- 13	4 1/2	+1	+28.5
O	DELTA DATA SYSTEMS	1- 2	3/4	0	0.0
O	DI/AN CONTROLS	1- 2	5/8	0	0.0
N	ELECTRONIC M & M	2- 4	1 5/8	- 1/8	-7.1
O	FARRI-TEK	1- 3	1 1/8	- 1/4	-18.1
O	GENERAL COMPUTER SYS	1- 4	1 1/4	0	0.0
N	GENERAL ELECTRIC	30- 65	33	-4 3/8	-11.7
N	HAZELTINE CORP	3- 7	3	0	0.0
O	INFOREX INC	2- 5	2 7/8	0	0.0
O	INFORMATION DISPLAYS	1- 1	1/8	0	0.0
O	INFORMATION INTL INC	7- 14	7	- 1/4	-3.4
A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/8	0	0.0
N	MEMOREX	2- 5	2 3/8	+ 3/8	+18.7
A	MILGO ELECTRONICS	6- 18	6 1/8	- 7/8	-12.5
N	MOHAWK DATA SCI	1- 4	1 1/2	0	0.0
O	ODEC COMPUTER SYST.	1- 3	1	0	0.0
O	OPTICAL SCANNING	3- 6	3 1/2	0	0.0
O	PERTEC CORP	2- 6	2 5/8	+ 1/4	+10.5
A	POTTER INSTRUMENT	2- 5	1 5/8	0	0.0
O	PRECISION INST.	1- 3	3/4	0	0.0
O	QUANTOR CORP	2- 8	2	- 1/4	-11.1
O	RECOGNITION EQUIP	2- 5	2	- 1/4	-11.1
N	SANDERS ASSOCIATES	2- 8	2 1/2	+ 1/4	+11.1
O	SCAN DATA	1- 2	1 1/8	0	0.0
O	STORAGE TECHNOLOGY	7- 15	7 7/8	- 3/8	-4.5
O	SYCOR INC	4- 13	5 3/4	+ 1/2	+9.5
O	TALLY CORP.	2- 4	2 1/8	- 1/4	-10.5
O	TEC INC	2- 7	1 3/4	- 1/4	-12.5
N	TEKTRONIX INC	22- 48	24 1/4	+ 1/2	+2.1
N	TELEX	3- 4	3 1/4	- 1/4	-7.1
O	WANGCO INC	5- 13	5	- 3/4	-13.0
O	WILTEK INC	2- 8	2	- 1/4	-11.1
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	4- 6	4 1/4	0	0.0
A	BARRY WRIGHT	4- 7	4 1/8	0	0.0
O	CYBERMATICS INC	1- 2	5/8	0	0.0
A	DATA DOCUMENTS	23- 54	29 1/2	-2	-6.3
O	DUPLEX PRODUCTS INC	6- 17	12 1/4	-1 3/8	-10.0
N	ENNIS BUS. FORMS	4- 7	4 5/8	- 1/8	-2.6
O	GRAHAM MAGNETICS	6- 11	6 1/2	0	0.0
O	GRAPHIC CONTROLS	6- 11	6 1/4	0	0.0
N	3M COMPANY	52- 79	51 3/4	-3 3/4	-6.7
O	MOORE CORP LTD	38- 57	37 3/4	-3 1/2	-8.4
N	NASHUA CORP	24- 45	25 1/4	- 1/2	-1.9
O	REYNOLDS & REYNOLD	8- 35	10 1/2	+1	+10.5
O	STANDARD REGISTER	10- 16	11	+ 1/4	+2.3
O	TAB PRODUCTS CO	5- 11	5	+ 1/4	+5.2
N	UARCO	15- 23	15	-1 1/4	-7.6
A	WABASH MAGNETICS	3- 7	3 1/4	- 1/4	-7.1
N	WALLACE BUS FORMS	14- 24	16 7/8	0	0.0

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